PENNSYLVANIA

COURSES OF STUDY

IN

AGRICULTURE

ANNEX 58

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DEPARTMENT OF PUBLIC INSTRUCTION

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COURSES OF STUDY
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Prevocational Agriculture for Rural Schools and for Junior High Schools
General Agriculture for High Schools
Vocational Agriculture for High Schools

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SYLLABUS IN AGRICULTURE FOR RURAL SCHOOLS AND FOR JUNIOR HIGH SCHOOLS.

SYLLABUS IN AGRICULTURE FOR RURAL SCHOOLS AND FOR JUNIOR HIGH SCHOOLS.

I. *Introduction.*

Agriculture in the rural school and junior high school should function in the following ways:

A. Interest the school in the community and the community in the school.
B. Vitalize the curriculum of the school.
C. Provide educational development of boys and girls through agricultural activities.
D. Provide pre-vocational experience in agriculture as a vocation.

The materials for study and the methods involved have been suggested with these functions in mind. The work in agriculture cannot be confined to the four walls of the schoolroom. Constantly the farms and field will be used as laboratories; the farmers will aid in solution of problems, the pupils will do at home some of the agricultural activities suggested at the school; habits of thrift, industry, and responsibility will be formed; and experiences gained that will help clarify the choice of agriculture as a vocation.

The junior project especially will contribute to these functions. The actual raising of a pig or chickens or one of the common farm crops as a part of the school work is perhaps the most effective way to have agriculture fulfill its function in the school curriculum. For this reason the junior project has been particularly stressed.

II. *Methods.*

A. Use the agricultural interests, experiences, and activities of the boys and girls as a basis for all instruction in agriculture.
B. Use living plants and animals for instruction.
C. Use textbooks and bulletins merely as aids in securing additional information for the solution of problems.
D. Motivate each exercise by presenting a real problem for solution.
E. Each lesson should result in some activity beyond the classroom.
F. Use abundant illustrative material.
G. Have pupils participate rather than observe.
H. Use parents and boys and girls as teachers whenever possible.

I. Have exhibits whenever possible. Use them to show the community the work being done by the pupils.

J. Correlate with art, English, whenever possible. Make agricultural booklets (See appendix).

K. Place work on a competitive basis whenever possible; use the contest idea.

L. Enlist aid of patrons, prominent farmers, agricultural supervisors, county superintendents, Department of Public Instruction.

III. Organization.

A. Combine seventh and eight grade pupils in one class.

B. Teach crops, to boys and girls of both grades, one year; teach animals, to boys and girls of both grades, the second year—rotate the subjects.

C. Use the equivalent of sixty minutes per week for agricultural work.

D. Do not attempt to teach all the lessons suggested for each month. Select those from each month best adapted to particular community.

E. The work has been organized on a seasonal basis. Start the junior projects in February. Decision, selection, and actual work must not be delayed.

IV. Order of topics.

	Crops	Animals
September	Lessons on corn. Seeding of crops—Wheat & rye Weeds—collect; eradication. Fruits—peaches, apples, pears, grapes. Fairs (Co.) (Boys' & Girls features)	Poultry—culling; care of moulting hen. Production—egg and milk records. Hogs—fattening and marketing. Fairs (Co.) (Boys' & Girls' features)
October	Nuts and nut trees. Corn-husking and storing; seed. Potato studies. Fall Arbor Day & Bird Day	Pullets—housing for winter. Bees—importance to farmer; removing honey. Poultry houses—types & arrangement. Fall Arbor Day & Bird Day
November	The garden—preparing for winter. Harvest festival and farm products show. Storage of seed for next year's crops. Thanksgiving—its festivities.	Fur-bearing animals (trapping) mink, weasel, muskrat, skunk, opossum, raccoon. Dairy cows—care, sanitation. Poultry for Thanksgiving market. Poultry show and judging.

	Corps.	Animals
December	Farm machinery—clean, repair, store. Corn judging and stringing. Potato judging. The woods—crops, as lumber, nuts, fun, etc. Trees in winter.	Preparing bees for winter. Horses, hogs, sheep, general care. Judging cows. Judging hogs.
January	State Farm Products Show. Farm machinery—overhaul & repair. Rope work. Map of home farms.	State Farm Products Show. Feeding farm animals—sheep, hogs. Farmstock census. Judging—horses and sheep.
February	Junior Projects.	Junior Projects.
March	Junior Projects.	Junior Projects.
April	Junior Projects.	Junior Projects.
May	Junior Projects.	Junior Projects.

Suggestive lessons and references for each of the lesson topics follow.

SEVENTH GRADE AGRICULTURE.

Farm Crops Lessons.

I. Selecting seed corn in the field.
  A. Method of selecting seed corn.
    1. While standing, from vigorous, erect stalks with good ears, on long strong shanks.
    2. In shocks, while husking, from stalks with desirable characteristics.
  B. Actual selection.
    1. Take class to nearby cornfield. Each member pick out ear on stalk desirable for seed; class discuss each other's selection. Each pupil then select five best ears, to take back to school.
  C. Problems.
    Why should we select seed corn for next year's crop this fall?
    Why should ears for seed corn be selected while on the stalk?
    How can we tell whether an ear will make desirable seed corn?
  D. References—(G253) (D133) (S10).*

II. Seeding of crops.
  A. Method of seeding wheat and rye.
    1. Good seed, cleaning, fanning; productive strains.
    2. Time to seed; Hessian fly and its destructive work.
    3. Machinery used; operation.
    4. Amount of seed per acre.

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*For key to references, See p. 28.

B. Pupils report on the crop seeding at their homes, on basis of the problems following:

C. Problems.

When should wheat be seeded here to avoid the Hessian fly?
What amount of seed, wheat and rye is drilled per acre?
How is soil prepared for planting?
What machine is used in seeding wheat? How does it operate?

D. References—(G265) (D154).

III. Fruits.

A. Common fruits on the farm.

B. Varieties of apples, indentification methods.

1. Perfect and imperfect apples; methods of preventing imperfect fruit. Pupils will bring apples from home and study varieties and condition.

C. Problems.

What fruit should be grown on every farm?
Which are the early and which the late varieties of apples?
How do varieties of apples differ in flavor, texture, keeping qualities? What are the best varieties?
What care and attention does an orchard require during the year?

D. References—(G300) (D212) (F. B. 1001)

IV. Agricultural Fairs.

A. Local fairs.

1. Purpose; educational features; value to community.

B. County fairs.

1. Purpose, educational features; value to county.
2. Kinds of exhibits at County Fair; classes; study of fair bulletin and premium list.

C. Activities for pupils.

1. Have pupils participate in boys' and girls' activities at the fair, including exhibits and judging contests.
2. Each pupil attending fair will report on some selected class exhibits, stating varieties and numbers exhibited, names of exhibitors and giving opinion on exhibits.
3. Enter an exhibit of school work in the county fair.

D. Problems.

Of what value are county fairs?
What can be learned by studying exhibits at county fairs?
Why are these fairs held in the fall of the year?
What crop products are exhibited at the fair this year?

E. References—(C312).

V. Nuts and nut trees.

A. Kinds of nuts common to Pennsylvania, especially mocker nut, hickory, shell-bark, black walnut, butternut, chestnut, and others.

B. Value of nut trees.
  1. For nuts produced, best kinds.
  2. For lumber.
  3. As compared with other forest trees.

C. Activities.
  1. Pupils report on kinds of nut trees of the community, and their location.
  2. Each pupil agrees to plant 20 edible nuts every fall for nut trees. This can be done by pressing a nut into the ground with the heel; planting should be done along roadsides and streams, and in thin woods.
  3. Make nut booklets.

D. Problems.

Why are nut trees among our most valuable trees?
How can we increase the number of nut trees?
What care and protection do growing nut trees require?

E. References.

"Pennsylvania Trees"—J. S. Illick, free from Pennsylvania Department of Forestry, Harisburg, Pa.

VI. Corn study.

A. Structure of corn plant, parts and purposes of parts. Relation of corn to other grasses.

B. Cutting and husking corn—cutting corn, by hand and by machine; machines used. Shocking corn, methods, reasons, changes in the shock. Husking; methods, tools used now and formerly.

C. Storing corn over winter; corn crop; seed corn, prevent freezing, avoid mice; method of stringing corn.

D. Corn for the silo.

E. Problems.

How is corn cutting and husking done in other parts of the State? (write to pupils there and inquire.)
What kind of machines are used for cutting and husking corn?
Should every farmer have a corn binder?
Do our fathers handle the seed corn properly over winter?
What is the corn variety test conducted by the County Farm Bureau?

F. Reference—(F. B. 537).

VII. Potato studies.

A. Preparing for a better crop next year.
1. Field selection of seed potatoes. From best producing hills, and disease free plants.
2. Notice effects of spraying in different patches; presence of diseased plants, ravages of insects.
3. Storing potatoes over winter in cool place.

B. Activities for pupils.
Take class out to study several potato fields before digging; demonstate hill selection of potato seed.

C. Problems.
What is the best potato seed?
Where shall we get our potato seed—buy it or select our best seed?
How can we select potato seed from our own fields?
How shall we take care of this seed until time to plant it next year?
What is the weight of a bushel of potatoes in this State?
How much did it cost per bushel, to raise potatoes at my home this year?

D. References—(G245) (D162) (S1).

VIII. Arbor day and bird day.

A. A manual with suggestions for observing this day can be had, free, by writing to the Department of Public Instruction, Harrisburg, Pa.

B. The whole school should have a short program on the appointed day, consisting of appropriate recitations and songs. Trees should be planted on the school yard or along the highway where they will protect the road.

IX. The garden.

A. Harvesting and disposing of crops.
1. Those to be sold at once.
2. Storage; those to be stored and methods, such as burying, or putting in cellar.
3. Crops to be left in garden, as root crops and winter onions and winter spinach.

B. Cleaning up garden; spading, turning under, crop residues; value.

C. Mulching perennial crops, as asparagus, strawberries, and some flowers.

D. Problems.
What effects do frosts have on garden crops?
How should the home garden be prepared for winter?

What can we do now to enrich the garden for next year?
How are cabbage, celery and beets kept for use during the winter?

E. Reference—(D191) (S30146)

X. Harvest festival and farm products show.

A. Pupils acting as committees will carefully arrange, with the teacher's help, an attractive fall exhibit and show to include the following:

1. Junior project work.
2. Corn (ten ears to each entry).
3. Potatoes (one half peck to each entry).
4. Fruit (one quarter peck to each entry).
5. Vegetables and garden produce.
6. Canned goods.
7. Flowers.

B. Have evening program of recitations, singing and addresses. Exhibits should be judged and ribbons awarded.

C. Problems—
How can we have a big Harvest Festival at our school each year?

D. References—
"The Community Fair", Ext. Bul. No. 27. Massachusetts Agricultural College, Amherst, Mass.

XI. Storing farm products for winter use.

A. Seed, such as corn, potatoes, oats and garden seed.
B. Farm feeds; oats, corn silage, timothy, and alfalfa hay.
C. Orchard products, as apples, pears, plums, peaches.
D. Animal products, eggs, pork, milk products.
E. Problems.
How is corn saved for next year's crop?
How is silage preserved for later feeding?
How are apples stored for use next spring?
How does smoking and curing preserve meat?

XII. Thanksgiving.

A. History and meaning of the day.
B. The farmer's dependence on divine aid through Nature.
C. Use farm products for decorating, such as corn stover and pumpkins.
D. Problems.
How can we properly observe Thanksgiving?
Can the farmer depend only upon his own help and knowledge in raising crops or animals?

XIII. Farm machinery.

A. Winter attention required.
   1. Clean and oil implements and machinery.
   2. Repair and replace parts.
   3. Store and house for winter.

B. Activities for pupils.
   1. Make an inventory of farm implements at their homes. State kinds of implements, number, probable value; repairs needed, how stored.
   2. Each pupil to get some practice in cleaning and repairing implements for winter storage; pupils to report on work they do.
   3. Make farm machinery booklet.

C. Problems.

   How is a grain binder put in condition for winter storage?
   How is a new handle fitted on a hay fork?
   How are new teeth put on mower blades? (D385)

D. References—(F. B. 946, 947)

XIV. Corn judging.

A. Use of score card. Write to School of Agriculture, State College, Pa. for corn score cards. Pupils should bring good ears of corn from their homes, arrange them in ten-ear samples, and judge these samples. Arrange with supervisor of vocational agriculture or with county agent to assist in this work.

B. Problems.

   How does corn judging help us to know good corn?
   What contests can we enter to make use of this knowledge?

C. References—(G260) (D135) (C109).

XV. Potato judging.

A. Varieties of potatoes, especially those grown locally.

B. Methods in judging potatoes; disease free, good quality, trueness to type. Pupils should bring potatoes from home for judging practice at school.

C. Problems.

   What varieties of potatoes are best for raising in our section?
   What common diseases do potatoes have?
   Do any of our potatoes have scab or fusarium wilt?

D. References—(D162) (C108)

XVI. The woods.

A. Crops from the woods, nuts, furs, lumber.
B. Lumber—kinds, cutting, care of woods.
C. Winter work in the farm woods.
D. Problems.
What do we get from the woods on our farms?
What kinds of trees are growing in the home wood lot, and for what is each kind useful?
What kind of wood should be cut for fuel each winter?
E. References—(G313) (D178) (F. B. 1117)

XVII. Pennsylvania State Farm Products Show.

A. Exhibits.
  1. Obtain catalog from Secretary of Agriculture, Harrisburg, Pa.
    a. Classes.
    b. Prizes offered.
    c. Special features.
B. Educational meetings.
  1. Obtain a program of meetings from Secretaary of Agriculture.
    a. Organizations of farmers which meet.
    b. Topics to be discussed.
    c. Speakers.
C. Activities.
  1. Have pupils send in exhibits to be entered in boys' and girls' classes, especially corn, potatoes, and eggs.
  2. Have each pupil select a subject from the program of speeches, and talk to the class about it.

XVIII. Rope work.

A. Uses of rope on the farm.
B. Construction and kinds of rope.
C. Practice for pupils.
  1. Making knots. Each pupil master at least the following knots; square, bowline, miller's, weaver's, slip and binder knots; double half hitch, timber hitch and clove hitch; whipping.
  2. Making splices; short splice, eye splice, crown and end splice.
D. Problems.
How is a bowline knot made and used?
How can two pieces of rope be spliced together.
E. Reference—(D376)

XIX. Map of home farms.

- A. Making a map.
  - 1. Showing buildings, roads, fields, woods, streams.
  - 2. Drawing map to scale.
  - 3. Laying off the farm on paper, showing measurements.
- B. Using map.
  - 1. Suggest changes for improved layout of the farm home.
- C. Problems.

  How are maps made?

  How shall we make maps of our homes?

  What improvements would we suggest in the arrangement of our farms?

XX. Pruning.

- A. What—grapes, fruit trees, raspberries, etc.
- B. How to prune various trees and bushes.
- C. Pruning required when transplanting young trees.
- D. Pruning old apple trees.
- E. Practice. See that the class gets some pruning practice during the spring; obtain assistance of a local orchardist.
- F. Problems.

  How shall we prune an old apple tree?

  How shall we prune a young apple tree ready to be planted?

  How shall we prune grape vines?
- G. References—(G 304, 367) (C27) (C28, 208) (S34).

XXI. The work in agriculture for the remainder of the year should be devoted to junior home projects. (See Appendix A. "How to organize and conduct junior home project work".) This involves both school and home work. Each pupil should select one of the projects suggested for this year, viz:

- A. Growing corn.
- B. Growing a garden.
- C. Growing potatoes.
- D. Growing truck as beans, cabbage, strawberies, sweet corn, tomatoes, etc.

An analysis of the factors involved in each project follows. The "activity steps" are the actual jobs the boy or girl must do in the execution of the practical work. They are here expressed actively so that the teacher by inquiring as to the different "activity steps" taken may know at once the status of the home work of the project.

In the column "knowledge required" is listed the information needed by the pupil to take successfully the "activity steps". This is the basis for the school work. A great deal of this information the pupil will have as a result of the class exercises in agriculture from September to February. Teach only those things in the "knowledge required" column that the pupil does not know.

Corn Project—Grow Corn

Activity Steps	Knowledge Required
1. Select variety	1. Varieties of corn 2. Adaptions to community and use.
2. Select land for planting	1. Soils best for corn 2. Fertility. 3. Location.
3. Secure seed	1. Best time to select seed. 2. Advantages of local or foreign seed. 3. Advantages of pure bred seed. 4. Amount. 5. Cost.
4. Test seed corn for germination	1. Preparation for test. 2. Methods of making test. 3. Germination requirements. 4. Reading the test.
5. Prepare soil for planting	1. Implements needed. 2. Time of year. 3. Operations. 4. Requirements of good seed bed.
6. Plant seed	1. Time to plant corn. 2. Depth of planting. 3. Distance in row and between the rows. 4. Rate. 5. Fertilizer to use.
7. Cultivate the crop	1. Time of cultivation for corn. 2. Frequency. 3. Depth. 4. Nearness to stalks.
8. Cut and shock the corn	1. Indications of maturity. 2. Time of year. 3. Methods and material used and needed.
9. Husk the corn	1. Proper time to husk. 2. Methods and materials needed.
10. Store the corn	1. Storage requirements of corn.
11. Sell the corn	1. Time of year to sell corn. 2. Price. 3. Markets.

Reference: Farmers' Bulletin. U. S. Department of Agriculture—No. 537—How to grow an acre of corn.

Garden Project—Grow a Garden

Activity Steps	Knowledge Required
1. **Select land for garden**	1. Kinds of soil best for garden. 2. Amount. 3. Location and drainage.
2. Plan the **garden**	1. Space requirements of different plants. 2. Light requirements of different plants. 3. Vegetables to be planted 4. Maturity requirements of different crops. 5. Succession cropping. 6. Inter-cropping.
3. Secure manure and fertilizers	1. Kinds of fertilizers. 2. Value of manure for garden. 3. Rate and time of application.
4. Secure seeds	1. Best seed houses. 2. Amount and kind needed. 3. How to order.
5. Grow young plants	1. Time to start seeds. 2. Requirements for growing seeds. 3. Diseases and methods of control.
6. Spade the garden	1. Time of year. 2. Condition of soil for spading. 3. Method.
7. Prepare seed bed	1. Tools necessary. 2. Requirements of a good soil.
8. Plant the seeds and plants	1. Requirements of different seeds and plants as to depth, time of planting, distance between rows, etc.
9. Cutlivate the garden	1. How soon after planting. 2. How soon after rains. 3. Depth for different plants. 4. Frequency.
10. Harvest vegetables	1. Method. 2. Frequency.
11. Sell the vegetables	1. Preparations necesary for market. 2. Requirements of market. 3. Market price.

References—Farmers' Bulletins, U. S. Department of Agriculture—No. 937 and **1044.**

Pennsylvania State College—Bulletin 76

Potato Project—Grow Potatoes

Activity Steps	Knowledge Required
1. Select variety	1. **Varieties of potatoes.** 2. Demands of market. 3. Tendency to freedom from disease.
2. Secure seed	1. **Where can seed be secured.** 2. Advantages of disease-free seed. 3. Amount of seed needed. 4. Cost.
3. Select land for planting	1. Soils best adapted for potatoes. 2. Location and drainage. 3. Fertility of soil. 4. Amount of land.
4. Care for seed	1. Methods to prevent sprouting. 2. Methods to prevent rotting.
5. Prepare soil for planting	1. Implements and machines needed. 2. When to prepare soil. 3. Cost.
6. Secure fertilizer	1. Kinds of fertilizer best for potatoes. 2. Amounts needed. 3. Cost. 4. Where secured.
7. Plant the seed	1. When should potatoes be planted. 2. Depth of planting. 3. Distance in row and between the rows. 4. Application of fertilizer.
8. Cultivate the crop	1. Time of cultivation. 2. Frequency of cultivation. 3. Depth of cultivation. 4. Lost cultivation.
9. Spray the crop.	1. Time of sprayings. 2. Frequency of sprayings. 3. Materials needed. 4. Method of application.
10. Dig the potatoes.	1. When crop is mature. 2. Condition of soil best for digging.
11. Store the crop.	1. Storage requirements
12. Sell the potatoes.	1. When to market potatoes. 2. Best market. 3. Prevailing price.

Reference: "Successful Potato Growing"—The Barrett Co., Baltimore, Md.

Truck Project—Grow beans, cabbage, strawberries, sweet corn, tomatoes, etc.

Activity Steps	Knowledge Required
1. Select land	1. Kinds of soil best for particular crop.
	2. Amount of land.
	3. Location, drainage, etc.
2. Secure seed or plants	1. Varieties needed.
	2. Where they can be secured.
	3. Amount needed.
3. Secure manure or fertilizer	1. Kinds and amounts for particular crops.
	2. Needs of particular soils.
	3. Methods of application.
	4. Cost.
4. Prepare soil for planting	1. Time of year.
	2. Implements needed.
	3. Condition of soil.
	4. Cost of preparation.
5. Plant the plants or seeds	1. Time of year.
	2. Time of day.
	3. Depth.
	4. Distance in row and between rows.
6. Cultivate the crop.	1. How soon after planting.
	2. Freqeuncy.
	3. How soon after rain.
	4. Depth for particular crops.
	5. Implements to use.
7. Protect from diseases and pests	1. Insects and pests common to particular crop.
	2. Method and materials to control.
8. Harvest the crops	1. Time to harvest different crops.
	2. Method.
9. Sell the product	1. Preparation for market.
	2. Market demands.
	3. Market price.

Reference: Pennsylvania State College. Bulletin 76

EIGHTH GRADE AGRICULTURE

Farm Animal Lessons.

I. Culling poultry.

A. Method of culling.

1. Examination of hens giving consideration to age, condition of bird, color of beak, skin and shanks, condition of molt, comb, vent, condition of abdomen and pelvic bones.

B. Actual culling practice.
  1. Demonstrate to pupils on a few hens.
  2. Give pupils practice in handling and examining hens.
  3. Have pupils cull their home flock.

C. Problems.

Why should the hens be culled in the fall of the year?

What is the relation of culling to egg production.

How often should culling be done?

D. References—(S-21) (Pa. 52)

II. Production records.

A. Their use, desirable forms, value, etc.

B. Activities.
  1. Have pupils design forms for keeping records of milk production and egg production.
  2. Have pupils keep accurate production records on cows and poultry at home.

C. Problems.

Does your father keep records of milk production of his cows?

Why should we keep accurate records of eggs and milk?

Can you give any reason for the difference in production from different cows and flocks of hens?

Calculate totals and averages for two months on cows and hens.

D. References: (D 307) (Pennsylvania State College)

III. Hogs.

A. Breeds common to community, other breeds, importance of hogs on the farm, age when marketed, how long to fatten, feeds used, best time to market.

B. Take class to prominent hog farmers or breeders in the community. Discuss with him the topics above. Secure information and literature from breeder's organizations.

C. Problems—How much is a good gain per day per hog during the fattening period?

How much does it cost to fatten a hog on your home farm?

How can you estimate the weight of a hog without weighing?

D. References: (G 416) (D 300)

IV. Fairs, especially the county fair.

See lesson IV. Seventh Grade Agriculture. Emphasize especially classes of livestock, the special boys' and girls' features and have as many boys and girls as possible participate in judging events.

V. Pullets.

A. Emphasize, feeding previous to housing, house needed, interior fixtures, feeding and care.
B. Activities.
  1. Observe home conditions and conditions of one of the successful poultry men of the community. Compare methods and report to class.
  2. Figure size of house for 100 hens, including floor space, window space, number of perches and location, number of nests, etc.
C. References: (G430) (D 305) (C 73)

VI. Bees.

A. Value of bees; their importance to farmer, importance to flowers and fruits; their house or hive, care necessary, the making of honey.
B. Have pupils report on experiences they have had with swarms of bees, locating bee trees, how to prevent stinging.
  1. Make bee booklets.
C. Problems.
  What are the names of the different kinds of bees in a colony:
  What is meant by "swarming"?
  How much honey can be taken from a hive in a year?
  How can you locate a bee tree?
D. References: (D 321) (G348) (C238) (F. B. 1198)

VII. Poultry houses.

A. Types of houses, plans, how to build, location, runs, fixtures
B. Activities—Visit several of the better poultry houses of the community, and observe construction, location, etc.
C. Problems.
  What is the best kind of floor for the house?
  How is ventilation secured in poultry houses?
  What is the best material for the roof?
  How much floor space must you have for 100 hens?
D. References: (G430) (C73) (S 36)

VIII. Fall Arbor Day and Bird Day.
  See lesson VIII. Seventh Grade Agriculture.

IX. Fur bearing animals.

A. Kinds of fur bearing animals common to Pennsylvania, as mink, weasel, muskrat, skunk, opossum, raccoon, fox, rabbit, squirrel. Their habits and characteristics.

B. Activities—Have pupils report on methods of capturing, preparing pelts, selling value, laws relating to trapping, bounties.

C. Problems.

What is a marsupial mammal?
Which animals hibernate in winter?
Do you know of anyone who has a "fur" farm?

X. Dairy cows.

A. Dairy breeds, housing, care, sanitary production of milk.

B. Visit the dairy of one of the progressive dairy farmers in the community. Have him tell about the care he gives his cows.

C. Problems.

How many pounds of feed does the average cow consume in a year?
What is the average production of milk per cow per year in your county; in Pennsylvania?
What is meant by roughage, concentrates, succulence?
What is meant by "dairy type"?

D. References: (G 366) (C 124) (D 279).

XI. Poultry for Thanksgiving.

A. Poultry most commonly used at Thanksgiving—turkeys, ducks, geese, guineas. How to fatten properly, prepare each for market, and market.

B. Have appropriate exercises centering interest around Thanksgiving and the part the turkey plays in Thanksgiving festivities.

C. References—(G 434, 439) (C 121).

XII. Poultry show.

A. Pupils should stage a poultry show at the school. Teacher may act as advisor to committees.

B. Activities—Secure crates, exhibitors labelling tags, ribbons as awards. Each pupil having a poultry junior project should exhibit. Pupils should judge the different classes. Compare results with placing of an official judge.

C. References—(G 441) (S 79).

XIII. Bees.

A. Bees in winter—place of hive, means of protection from cold, feeding requirements, activities of bees in winter.

B. Activities—Visit an apiary, observe and report on conditions around the hive.

C. Problems.
On what do bees feed in winter?
Is the swarm as large in December as in June?
Would it be wise to provide heat for bees in winter?
D. References: (G 349) (C 238) (D 321) (S. K. 213) (F. B. 1012-1014).

XIV. Care of stock.

A. Winter quarters and care of horses, cows, hogs and sheep. Study especially feeding requirements in winter, relation of exposure to amount and kinds of feed; value of grooming.
B. Problems.
Why are hogs less closely confined than horses and cows?
What diseases are liable to result from too much exposure; from too close confinement?

XV. Judging cows.

A. Secure score card from Pennsylvania State College. Study carefully all the words mentioned on the card. Learn to locate all the parts of the cow mentioned on the card. Form an ideal in mind of a good cow.
B. Arrange with farmer for use of some cows for judging work. Go as a class to the farm and do practice judging. Ask some one in community who is a good dairy judge to check upon results.
C. References: (S 59) (C 102) (Pa. 52. Extension Circular)

XVI. Judging hogs.

Same procedure as for judging cows.
References: (C 105) (D 369) (Pa. 52. Extension Circular)

XVII. State Farm Products Show.
Same as Lesson XVII, Seventh Grade.

XVIII. Birds and the farmer.

A. Know common birds; feeding habits, nesting habits, value to farmer, how to protect, how to encourage.
B. Activities—Make bird houses.
C. Problems.
What birds are protected by law? Why?
What birds are not protected by law? Why?
What is a "bird preserve?"
D. References: (D 240) (G 334) (C 200)

XIX. Farm stock census.

A. Number and kinds of stock on pupils home farm and in community.

B. Activities—Have pupils prepare census forms for use. Have each pupil make a census of animals on home farm.
Tabulate and have complete census of community.
Make a stock map of the community.

C. Problems.
Has a census ever been made of the stock on your farm before? By whom made? What was included that you did not include?

XX. Judging horses and sheep.

Follow same procedure as outlined in lesson XV—Eighth grade, for judging cows.

References: (C 91) (D 275) (Pa. 52, Extension Circular)

XXI. The work in agriculture for the remainder of the year should be devoted in junior home projects. (See Appendix A. "How to organize and conduct junior home project work.") This involves both school and home work. Each pupil should select one of the projects suggested for this year, viz:

A. Raising chicks.
B. Keeping poultry for eggs.
C. Raising pigs.
D. Raising a calf.
E. Raising rabbits.
F. Keeping bees.

An analysis of the factors involved in each project follows. The "activity steps" are the actual jobs the boy or girl must do in the execution of the practical work. They are here expressed actively so that the teacher by inquiring as to the different "activity steps" taken may know at once the status of the home work of the project.

In the column "knowledge required" is listed the information needed by the pupil to take successfully the "activity steps". This is the basis for the school work. A great deal of this information the pupil will have as a result of the class exercises in agriculture from September to February. Teach only those things in the "knowledge required" columns that the pupil does not know.

Poultry Project—Raise Chicks

Activity Steps	Knowledge Required
1. Select a breed	1. Kinds of breeds—advantages and disadvantages. 2. Adaption of particular breed to particular needs. 3. Personal fancy.
2. Secure eggs	1. Number of eggs needed. 2. Where eggs may be secured. 3. When to secure eggs. 4. Cost.
3. Make and place the nest	1. Materials best for nests. 2. Side and shape of nest. 3. Best location for nest.
4. Set the hen	1. What constitutes a good "sitter". 2. How to determine above. 3. Time of day to set hen. 4. Number of eggs per hen.
5. Care for the sitting hen	1. Food requirements. 2. Disease and lice prevention.
6. Care for the hatch	1. When to expect hatch. 2. Attention required while hatching.
7. Prepare coop for chicks	1. Materials to be used 2. Size of coop. 3. Protection from rodents and animals. 4. Disinfection methods. 5. Location.
8. Take the hatch from the nest	1. How soon after hatching. 2. Method of handling. 3. Time of day. 4. Treatment for lice.
9. Feed the young peeps	1. Time for first feed. 2. Kinds and amount of first feed. 3. Feeding methods for first two weeks.
10. Feed and care for growing chicks	1. Feeding methods for growing chicks. 2. Importance of cleanliness, regularity, etc.
11. Dispose of surplus stock	1. Best age for selling surplus stock. 2. Markets best for particular product.

Reference: Farmers' Bulletins, U. S. Department of Agriculture, Numbers 1040, 1108, 1111.

Pennsylvania State College, Bulletins 47 and 62

Poultry Project—Keep Poultry

Activity Steps	Knowledge Required
1. Select the breed	1. Kinds of breeds—advantages and disadvantages. 2. Adaption of particular breeds to particular needs. 3. Personal fancy.
2. Secure the birds	1. Where particular breed can be secured. 2. Approximate cost. 3. Best age for laying. 4. Purity of stock.
3. Prepare house.	1. Size house necessary. 2. Desirable location. 3. Standards for interior fixtures.
4. Feed the hens	1. Best food for egg production. 2. Amount of feed at a feeding. 3. Methods of feeding.
5. Care and manage the flock	1. Methods of disease prevention and control. 2. Adjuncts to feeding for egg production. 3. Food, water cleanliness, and regularity as essentials in management. 4. Cost of food and management.
6. Collection and care of eggs	1. Time to collect. 2. Method of collection. 3. Storage of eggs.
7. Sell the eggs	1. Frequency of selling for good quality. 2. Where are good markets?

References: Farmers' Bulletins—U. S. Department of Agriculture, 889, 898, 1040, 1105, 1112, 1113.
Pennsylvania State College, Bulletins 47 and 62

Pig Project—Raise and Fatten Pigs

Activity Steps	Knowledge Required
1. Select the breed	1. Different breeds of pigs and advantages and disadvantages.
2. Secure the pig	1. Where particular breeds can be secured. 2. Probable cost. 3. Advantages of pure bred. 4. Individual points to be considered in selecting pig. 5. Desirable age for fattening.

Pig Project—Raise and Fatten Pigs.
(Continued)

3. Provide shelter	1. Type of pen needed. 2. Size. 3. Location desirable.
4 Provide range	1. Size or space per pig. 2. Location. 3. Fencing requirements. 4. Crops to be grown in range.
5. Keep the pig growing	1. Proper food requirements. 2. Proper water requirements 3. Proper exercise needed for hogs. 4. Proper health requirements
6. Fatten the pig	1. Food, water, and exercise requirements for fattening.
7. Sell the pig	1. Age to sell. 2. Condition of salable fatted pigs. 3. Price required for profit

References: Farmers' Bulletins, U. S. Department of Agriculture—No. 874—Swine Management.
Pa. 77—Swine Feeding and Management.

Calf Project—Raise a Calf

The junior project in calf raising should be limited to the more mature boys and girls. Pure bred calves are desirable if proper supervision can be secured and if a sufficient group is interested in a particular breed.

Activity Steps (Things the pupil must do.)	Knowledge Required (to do the activities successfully)
1. Select breed	1. Different breeds of dairy cattle. 2. Adaption of breeds for particular purposes and conditions.
2. Buy calf	1. Where desirable calf can be secured. 2. Probably cost. 3. Individual points to be considered in buying calf 4. Advantages of pure breeds vs. grades.
3. Wean calf	1. At what age calves should be weaned. 2. Method of teaching calves to drink from pail.
4. Feed calf	1. Necessary foods—concentrates, roughage. 2. Frequency of feeding. 3. Amount at different ages.
5. Care for calf	1. Importance of abundant and good food and water. 2. Importance of shelter. 3. Importance of grooming and care.

Farmers Bulletin, U. S. Department of Agriculture, No. 777.
Pennsylvania State College—Circular 60—Raise the Heifer Calf.

Rabbit Project—Raise Rabbits

Activity Steps	Knowledge Required
1. Select breed	1. Different kinds of rabbits. 2. Advantages and disadvantages of each.
2. Secure rabbits	1. Where particular breed may be secured. 2. Number desired. 3. Probable cost.
3. Make a hutch and pen	1. Desirable size. 2. Materials needed. 3. Method of construction to provide convenience and protection.
4. Feed and care for rabbits	1. Necessity of proper food. 2. Necessity of pure water. 3. Necessity of cleanliness. 4. Proper handling.
5. Mate rabbits	1. Age of mating 2. Selection of mate. 3. Frequency of mating.
6. Wean young rabbits	1. Age of weaning. 2. Food for young rabbits—kinds and amounts.
7. Sell surplus stock	1. Demands of market. 2. Reliability of buyer. 3. Preparing rabbits for shipment.
8. Crate for shipment	1. Requirements of good shipping crate. 2. Where secured.

Reference: Farmers' Bulletin, U. S. Department of Agriculture, 1090.

Bee Project—Keep Bees

Activity Steps	Knowledge Required
1. Secure a swarm.	1. Where swarms may be purchased. 2. How to secure a wild swarm.
2. Secure a hive.	1. Where bees can be purchased. 2. Possible cost. 3. Desirable kinds.
3. Place the hive.	1. Best location for bees. 2. Distance from the ground. 3. Distance between the hives.
4. Hive the swarm.	1. Equipment needed for handling bees. 2. Operations and methods of "hiving".

Bee Project—Keep Bees.

Continued

Activity Steps	Knowledge Required
5. Place supers.	1. When additional supers should be added 2. Number of supers on a hive.
6. Care for during summer.	1. Protect from robber bees. 2. Time of day and kind of days to examine swarm.
7. Prevent swarming.	1. Condition and appearance of hood previous to swarming. 2. Location, identification and destruction of possible queen cells.
8. Remove honey.	1. Time of year for honey removal. 2. Condition of swarm for honey removal. 3. Method removal
9. Protect during winter.	1. Shelter necessary. 2. Ventilation needed. 3. Temperature requirements. 4. Feed requirements
10 Care during spring.	1. Feed requirements. 2. Desirable strength of swarms.

Reference: Farmers' Bulletins, U. S. Department of Agriculture—447, 961.

V. Reference List.

Books

Key	Author	Book	Publisher
G.	*Grim*	"Elementary Agriculture"	Allyn & Bacon, N. Y.
C.	*Cromwell*	"Agriculture & Life"	J. B. Lippincott Co., Philadelphia, Pa.
D.	*Davis*	"Productive Farming"	J. B. Lippincott Co., Philadelphia, Pa.
S.	*Schmidt, G. A.*	"Laboratory, Field & Project Guide to Agriculture"	D. Appleton & Co., New York City.
SK.	*Skilling, W. T.*	"Nature Study Agriculture"	World Book Co., New York.
F.B.		Farmers Bulletins—U. S. Department of Agriculture. Washington, D. C.	
Pa.		Bulletins from School of Agriculture, State College, Pa.	

NOTE—Write to "Division of Publications", U. S. Department of Agriculture, Washington, D. C., and ask for "list of Farmers' Bulletins".

Books for teacher's shelf.

Freeland—"Elementary School Practice".—Macmillin Co., N. Y.
Storm & Davis—"How to Teach Agriculture"—J. B. Lippincott. Philadelphia.
Bailey—"School book of Farming,—Macmillan Cômpany, N. Y.
McCready—"Rural Science Reader"—D. C. Heath & Co.
Colvin Stevenson—"Farm Projects"—Macmillan Co., N. Y.

Farm Papers.

The Pennsylvania Farmer, Philadelphia, Pa.
The National Stockman & Farmer, Pittsburgh, Pa.
The Country Gentleman, Philadelphia, Pa.
The Poultry Item, Sellersville, Pa.

APPENDIX A

How to Organize and Conduct Junior Home Projects

I. Tell the pupils about the opportunities junior home project work offers them. Stress the facts that it gives them a chance to do something themselves—to learn by doing, to win a prize at a contest or exhibit, to secure a certificate of achievement for successful completion of project, to earn some money.

II. Tell about boys and girls in Pennsylvania, who have conducted junior home projects.
Examples

A. Meda Calaman—Twelve years of age, a pupil in the Blosserville School, chose chicken raising as her project. She secured three settings of pure-bred Rhode Island Reds, hatched 37 chicks and raised every chick except one which died as the result of an accident. With the assistance of her father, the male birds of the flock were caponized and these birds prepared for the holiday markets which aided materially in making an unusually good margin of profit. After deducting all expenses for labor,, feed, etc., she made a profit of $57.59.

B. Jacob Berkheimer—Sixteen years old, attended the Reiffs' School, and selected a Truck Patch as his project. Jacob made a special study of insects and diseases affecting garden crops. By controlling the mildew he was successful in raising an unusually fine crop of fall peas. This year the garden turned out a net profit of $30.42 and Jacob is planning a much larger truck patch as his project for next season.

C. Bessie Naugle—Fourteen years old, a pupil of the Centerville School, had unusual success with her purebred White Leghorns. Bessie set 30 eggs, 30 chicks were hatched from these eggs, and every chick lived and thrived until ready to go to market. Bessie's records show that her chicks made her a net profit of $22.52.

III. Suggest the projects they may carry on for the particular year, such as growing a garden, growing corn, growing potatoes, growing a truck crop as beans, cabbage, strawberries, sweet corn or tomatoes; or raising chicks, keeping hens for eggs production, raising and fattening pigs, raising a calf, raising rabbits or keeping bees.

IV. Have pupils make temporary selection of particular junior projects they would like to undertake.

V. Distribute enrollment cards. (The junior project enrollment card may be secured from the Department of Public Instruction.)

VI. Have pupils discuss the matter with their parents and secure their coöperation and permission.

VII. Have pupils make final selection. Make an effort to have every boy and girl decide definitely upon a project. Secure junior project record books. Have pupils keep accurate records.

VIII. Have pupils organize into a group—elect president, vice-president, secretary. Have them adopt a suggestive name as, "The Junior Project Potato Growers of . . . . School", or "The Junior Project Gardeners of . . . . School or . . . . Township". Allow no pupil to be a member of the group unless he will carry on an actual project.

IX. Have pupil make a definite start by taking the first "activity steps" as outlined for the different projects. The "knowledge required" will serve as a guide to the instruction necessary to enable the pupils to make the "activity steps" successful.

X. The progress of the junior project can be determined at any time by the number of activity steps the pupil has taken.

XI. Supervise the work either by personal visits to the home of the pupil yourself or by someone interested. Confer with the parents and be sure they are interested in the successful completion of the undertaking of their children.

XII. Provide hikes, trips to the different projects, contests, games, at group meetings during the summer.

XIII. Plan for a fall exhibit at which products, record books, and stories be exhibited. Do this before school closes in the spring. It will serve as an incentive for good work during the summer.

XIV. Have fall exhibits and roundups. Make awards of certificate of achievement for successful completion.

XV. Write Department of Public Instruction regarding any addition information or help needed.

APPENDIX B

How to Make Agricultural Booklets

I. Materials: Writing or laboratory note paper, 8x10 or 9x12 inches, construction paper, cards or paper fasteners, scissors, paste, clippings from farm papers, magazines or old bulletins.

II. Method.

A. Decide upon kind of booklet to be made—example, poultry, corn, nut, pig, wild animal, farm power or any booklet relating to agriculture and agricultural life.

B. Outline table of contents.

C. Place this outline neatly on page (1) with appropriate design, poem, or photograph relating to main theme of the booklet.

D. On page, 2, 3, 4, 5, etc. write neatly in ink a discussion of the various topics outlined as indicated by the table of contents. Be careful about margins.

E. Use illustrations, pictures, poems freely. Place them artistically. Write only one side of the paper, paste only corners of photographs.

F. Use colored construction paper about one-fourth inch larger on all sides than the writing paper for covers.

G. Print the name of booklet neatly on the cover page and design with original design, drawing or photograph.

H. Bind at side or top with cord or paper fasteners—cord most desirable.

III. Use

A. To correlate agriculture with writing, language, drawing and design.

B. To develop individuality, originality and independence of expression.

C. To provide attractive exhibit and contest material.

(half title)

SYLLABUS IN GENERAL AGRICULTURE FOR HIGH SCHOOLS.

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SYLLABUS IN GENERAL AGRICULTURE FOR HIGH SCHOOLS.

I. *Introduction*

Agriculture is one of the most ancient of the occupations of man. From the most primitive to the most modern stage of family life the members needed to be provided with food, shelter and clothing. In the early stages, food was secured by hunting, fishing and the collecting of edible roots and nuts; a cave or sheltered nook served as shelter; clothing was secured from the skins of animals. In the later stages, shepherding, domestication of animals, the training and use of animals for food and as beasts of burden became an essential part of the industry; seeds were stored and planted; cultivation of plants for food and clothing developed; trading was established; division of labor resulted; until today agriculture is one of our most complex occupations. It still remains the basis of civilization.

Previously all men were farmers. Today the percentage of farmers has decreased. All, however, remain dependent upon those who till the soil, husband the animals and produce the essential elements whereby families are clothed, fed and sheltered.

The development of this industry has paralleled the development of the Nation. The American continent has witnessed all its stages since the settlement at Jamestown and the landing of the Pilgrims. The American farm and the American farmer of today represent the highest type in this agricultural development.

II. *Aims of the course.*

A. To present a historical background of the development of agriculture in America.

B. To become familiar with some of the social, economic, scientific and occupational phases of farm life.

C. To provide such activities as will give those contemplating agriculture as a vocation sufficient experiences to enable them to determine more wisely their adaptability to farming as a career.

III. *Organization:*

The work has been arranged in a topical sequence. One unit of credit may be had for successful completion of the course. This involves the equivalent of one sixty-minute recitation period daily. It is suggested that four sixty-minute recitation or discussion periods be used weekly and one ninety-minute period per week be used for field trips, demonstrations or laboratory. The junior project should be begun in the spring of the year. Credit should be withheld for the course until this phase of the work has been completed successfully.

IV. *Methods.*

A variety of methods are adaptable to the course. In addition to the usual methods of recitations, class discussions and field trips, the following are suggested:

A. *Demonstration.* Have one of the older farmers of the community demonstrate to the class the use of the cradle, flail, "winnowing" or some other agricultural practice not in use at the present time. Have them demonstrate also some of the best phases of modern practice.

B. *Lectures.* Have retired farmers in the community tell the class about farming practices and methods of their boyhood days. Have active progressive farmers tell the class about methods and practices now in use.

C. *Trips.* (1) Take class to the County Historical Museum, Have them see and discuss implements used by their forefathers; (2) Make trips to up-to-date farms and study present day methods.

D. *Reports.* Have individual pupils read and report on topics such as:

1. The evolution of the grain binder.
2. Farm recreations.
3. The farm as a home.
4. Superstitions of the farmer.
5. Life history and control of the Hessian fly, etc.

E. *Debates.* Have a debate on a farm question monthly. Suggestive questions are:

1. Resolved, That the farm is a better place to raise a family than the city.
2. Resolved, That every farmer should be member of the County Farm Bureau.
3. Resolved. That poultry raising is more profitable than dairying.
4. Resolved, That every farmer raising cattle should have a silo.

E. *Projects.* Each pupil should be encouraged to carry on a junior project or the actual production of a crop or animal on an economic basis. Aim "C" will not be realized unless this is done.

Use should be made constantly of the local agricultural environment. Each community doubtless has contributed something to the agricultural development of the Nation. Each community doubtless has some agricultural practices peculiar to itself. Use these as a basis for developing methods of agricultural practice common to the communities. Frequent use should be made of all local help available, current farm papers, magazines, industrial exhibits, and up-to-date agricultural literature. Have your school placed on the mailing list of the United States Department of Agriculture, Washington, D. C. and the Pennsylvania State College, State College, Pa., to receive all publications issued.

V. *Outline of topics to be treated.*

A. Early agriculture in America.
  1. Agriculture of the American Indian.
    a. In New England.
    b. Surrounding the Great Lakes.
    c. In the Southwest.
    d. On the Pacific Coast.
  Suggested topics regarding each.
    a. Plants raised and used for food and shelter; cultural and harvesting methods.
    b. Animals used.
    c. Implements used for agricultural purposes.

  2. Colonial agriculture.
    a. In Virginia.
    b. In New England.
    c. In Middle Atlantic states.
    d. In the Carolinas.
  Suggested topics regarding each.
    a. The principal crops and cultural methods.
    b. Livestock and live stock methods.
    c. Introduction of crops and animals.
    d. Size of farms.
    e. Agricultural labor.
    f. Social conditions.

  3. Improvement of early American agriculture.
    a. By improvement and introduction of new crops, animals, and cultural methods.
      (1) Timothy Hanson developed timothy from native grass in 1720.
      (2) Washington and Jefferson experimented with various plants and kept accurate dairy of different cultural methods.

(3) Book on agriculture written and published by Jared Elliott in 1750.
(4) Morgan horses developed in New England in 1800.
(5) Henry Clay, first importer of Hereford cattle in 1817.
(6) Mules developed on Washington's farm at Mount Vernon.

b. By organization of Agricultural Societies—activities consisted of organizing exhibits of farm crops and animals and promoting contests as plowing matches, etc. Early agricultural societies:

(1)	Charlestown, S. C.	1784.
(2)	Philadelphia, Pa.	1785.
(3)	New York, N. Y.	1791.
(4)	Massachusetts	1792.

c. By agricultural journals: early publications:
(1) The Plow Boy, Albany 1819.
(2) The American Farmer, 1819.
(3) The New England Farmer, Boston, 1822.
(4) The New York Farmer, New York, 1827.
(5) The Southern Agriculturist, Charlestown, 1828.

4. The farm of our grandfathers—Pennsylvania farm of 1850-60.

a. Activities on the farm—clearing the land, building fences, plowing and tilling the soil, planting, hoeing, harvesting crops, threshing, butchering, building house and barn, cleaning grain (winnowing), caring and feeding animals, making ax-helves, ox-yokes, wooden bowls, spoons, chairs, furniture for the home, etc.
b. Activities in the home—baking, dyeing and bleaching linen, making clothing, churning, making candles, making soap, drying fruit and vegetables, etc.
c. Animals on the farm—cows, oxen, horses, sheep, poultry, dogs—uses of each.
d. Crops grown—corn, oats, rye, potatoes, buckwheat, wheat, flax, fruit, vegetables—uses of each.
e. Implements used—axe, sickle, scythe, cradle, crude plow, harrow, drag, hoe, shovel, hand rake, fork, flail.
f. Coöperating and social activities—husking bees, "schnitzing" parties, barn raisings, butcherings plowing matches, mowing and cradling matches, spelling bees, quilting parties, singing schools.

B. Modern agriculture of other lands.

1. The agriculture of England, France, Germany, Italy, Holland, Norway, Denmark, Australia, Canada, Mexico, China.
2. Topics suggested for consideration for each of the above.
    a. Social life of the farmers.
    b. Size of farms.
    c. Products raised.
    d. Use of animals.
    e. Use of farm machinery.

C. Modern agriculture in Pennsylvania.

1. The modern farm.
    a. Present day activities on the farm feeding animals, raising crops with machinery, repairing machinery, combating insects and diseases by spraying, preparing produce for the market.
    b. The farm home—activities in the home, comforts, labor saving devices.
    c. Things with which the farmer works.
        (1) Plants—kinds for food, manufacture, building, pleasure; how plants feed, photosynthesis.
        (2) Animals—domesticated and wild; for food, work, clothing, soil fertility, and pleasure.
        (3) Soil—source, composition, kinds of work with the soil, relation to farmers' success.
        (4) Water—sources, uses, how controlled.
        (5) Air—Composition, use by plants and animals.
        (6) Implements—horse drawn, as plow; machines as mower; power machines, as tractors; part implements and machinery play in the farmer's life.
        (7) Other farmers—neighbors, business relations.
2. Important crops grown on Pennsylvania farms.
    a. Wheat, corn, oats, rye, clover, alfalfa, timothy, buckwheat, tobacco, potatoes, truck crops, fruits, small fruits.
    b. Study outline for each crop.
        (1) Importance and production in Pennsylvania and in the United States (See U. S. census and State crop reports.)
        (2) Origin and early history.
        (3) Study of the plant, form, parts and use of parts.
        (4) Varieties or kinds.
        (5) Soils, climate, cultural methods.
        (6) Diseases and insect pests and control.
        (7) Ways of improving the crop.

3. Important animals on Pennsylvania farms.
    a. Horses, cattle, swine, sheep and poultry.
    b. Study outline for each kind.
        (1) Importance and production in Pennsylvania and in the United States.
        (2) Origin and history.
        (3) Study of life habits. needs and care required.
        (4) Usefulness to man.
        (5) Breeds and strains.
        (6) Ways of improving for man's purposes.

4. Modern farm machinery on Pennsylvania farms.
    a. Kinds of machinery.
        (1) Tillage machines—plows. harrows. rollers. cultivators.
        (2) Planting machines—seeders, grain drills. corn. potato. cabbage and tobacco planters.
        (3) Harvesting machines—binders. corn harvester. mowers, hay tedders. hay rakes. hay loaders. potato diggers.
        (4) Miscellaneous—hay forks and tracks. manure spreaders, lime spreaders, ensilage cutters. feed grinders. threshing machines. fanning mills. spraying machines, gasoline engines. farm tractors. milking machines.
    b. Study outline. (Supplement with machinery catalogs)
        (1) History and development.
        (2) Construction.
        (3) Use and importance to the farmer.
        (4) Special care and attention required.

5. Types of farming occupations in Pennsylvania.
    a. General farmer.
    b. Special types.
        (1) Dairyman.
        (2) Poultryman.
        (3) Stock raiser.
        (4) Florist.
        (5) Fruit grower.
        (6) Gardener or trucker.
        (7) Nurseryman.
        (8) Lumberman.
        (9) Forester.
        (10) Apiarist.
        (11) Farm laborer.

c. Study outline for each type of occupation.
  (1) Importance in community and to society.
  (2) Training required.
  (3) Work performed.
  (4) Advantages and disadvantages.
  (5) Requirements of those engaged in each occupation.
  (6) Healthfulness of each occupation.
  (7) Possibilities for earning good income.

d. Reference—"Studies of Occupations in Agriculture, Forestry, and Animal Industry", by Frederick J. Allen, Bureau of Vocational Guidance, Harvard University, Cambridge 38. Mass. (Price 40¢)

6. Aids to the farmer.

  a. Business aids; the work of each.
    (1) United States Department of Agriculture.
    (2) Penna. Department of Agriculture.
    (3) Penna. State College.
    (4) County Farm Bureau.
    (5) Vocational agricultural schools.
    (6) Farm products shows and fairs.
    (7) Agricultural societies.
    (8) Grange.
    (9) Coöperative buying and selling organization.
    (10) Farm newspapers and magazines.
    (11) Banks.
  b. Social aids—how they have helped the farmer.
    (1) Automobile.
    (2) Good roads.
    (3) Rural free delivery.
    (4) Public libraries.
    (5) Chautauquas.
    (6) Good schools.
    (7) Church.
    (8) Grange.
    (9) Telephone.
    (10) Radio.
    (11) Musical instruments.

VI Junior home projects.

The junior project should consist of actual participation. on an economics basis, in one of the productive farm enterprises. Suggestions.

A. Growing corn.
B. Growing a garden.

C. Growing potatoes.
D. Growing truck, as beans, cabbages, strawberries, etc.
E. Growing chicks.
F. Keeping poultry for eggs.
G. Raising pigs.
H. Raising a calf.
I. Raising rabbits.
J. Keeping bees.

In the outlines that follow an analysis is made of each of the projects suggested. "Activity steps" refer to the actual jobs or things to be done in the project activity. The "knowledge required" relates to that information that is necessary to successfully take the "activity steps". For more detailed information regarding the organization of junior projects, write the Department of Public Instruction.

Corn Project—Grow Corn

Activity Steps	Knowledge Required
1. Select variety.	1. Varieties of corn.
	2. Adaptations to community and use.
2. Select land for planting.	1. Soils best for corn.
	2. Fertility.
	3. Location.
3. Secure seed.	1. Best time to select seed.
	2. Advantages of local or foreign seed.
	3. Advantages of pure bred seed.
	4. Amount.
	5. Cost.
4. Test seed corn for germination.	1. Preparation for test.
	2. Methods of making test.
	3. Germination requirements.
	4. Reading the test.
5. Prepare soil for planting.	1. Implements needed.
	2. Time of year.
	3. Operations.
	4. Requirements of good seed bed.
6. Plant seed.	1. Time to plant corn.
	2. Depth of planting.
	3. Distance in row and between rows.
	4. Rate.
	5. Fertilizer to use.
7. Cultivate the crop.	1. Time of cultivation for corn.
	2. Frequency.
	3. Depth.
	4. Nearness to stalks.

Corn Project—Grow Corn

(Continued)

Activity Steps	Knowledge Required
8. Cut and shock the corn.	1. Indications of maturity. 2. Time of year. 3. Methods and materials used and needed.
9. Husk the corn.	1. Proper time to husk. 2. Methods and materials needed.
10 Store the corn.	1. Storage requirements of corn.
11. Sell the corn.	1. Time of year to sell corn. 2. Price. 3. Markets.

Reference —Farmers' Bulletin, U. S. Department of Agriculture—537—How to grow an acre of corn.

Garden Projects—Grow a Garden

— Activity Steps	Knowledge Required
1. Select land for garden.	1. Kinds of soil best for garden. 2. Amount. 3. Location and drainage.
2. Plan the garden.	1. Space requirements of different plants. 2. Light requirements of different plants. 3. Vegetables to be planted. 4. Maturity requirements of different crops. 5. Succession cropping. 6. Inter-cropping.
3. Secure manure and fertilizers.	1. Kinds of fertilizers. 2. Value of manure for garden. 3. Rate and time of application.
4. Secure seeds.	1. Best seed houses. 2. Amount and kind needed. 3. How to order.
5. Grow young plants.	1. Time to start seeds. 2. Requirements for growing seeds. 3. Diseases and methods of control.
6. Spade the garden.	1. Time of year. 2. Condition of soil for spading. 3. Method.
7. Prepare seed bed.	1. Tools necessary. 2. Requirements of a good soil.

Garden Project—Grow a Garden

(Continued)

Activity Steps	Knowledge Required
8. Plant the seeds and plants.	1. Requirements of different seeds and plants as to depth, time of planting, distance between rows, etc.
9. Cultivate the garden.	1. How soon after planting. 2. How soon after rains. 3. Depth for different plants. 4. Frequency.
10. Harvest vegetables	1. Method. 2. Frequency.
11. Sell the vegetables	1. Preparations necessary for market. 2. Requirements of market. 3. Market price.

Reference—Farmers' Bulletins, U. S. Department of Agriculture—Nos. 937 and 1044.

Potato Project—Grow Potatoes

Activity Steps	Knowledge Required
1. Select variety.	1. Varieties of potatoes. 2. Demands of market. 3. Tendency to freedom from disease.
2. Secure seed.	1. Where can seed be secured. 2. Advantages of disease-free seed. 3. Amount of seed needed. 4. Cost.
3. Select land for planting	1. Soils best adapted for potatoes. 2. Location and drainage. 3. Fertility of soil. 4. Amount of land.
4. Care for seed	1. Methods to prevent sprouting. 2. Methods to prevent rotting.
5. Prepare soil for planting	1. Implements and machines needed. 2. When to prepare soil. 3. Cost.
6. Secure fertilizer.	1. Kinds of fertilizer best for potatoes. 2. Amounts needed. 3. Cost. 4. Where secured.
7. Plant the seed	1. When should potatoes be planted. 2. Depth of planting. 3. Distance in row and between the rows. 4. Application of fertilizer.

Potato Project—Grow Potatoes

(Continued)

Activity Steps	Knowledge Required
8. Cultivate the crop	1. Time of cultivations. 2. Frequency of cultivations. 3. Depth of cultivation. 4. Last cultivation.
. Spray the crop	1. Time of sprayings. 2. Frequency of sprayings. 3. Materials needed. 4. Method of application.
0. Dig the potatoes	1. When crop is mature. 2. Condition of soil best for digging.
1. Store the crop	1. Storage requirements.
2. Sell the potatoes	1. When to market potatoes. 2. Best market. 3. Prevailing price.

Reference—"Successful Potato Growing"—The Barrett Co., Baltimore Md.

Truck Project—Grow beans, cabbage, strawberries, sweet corn, tomatoes, etc.

Activity Steps	Knowledge Required
Select land	1. Kind of soil best for particular crop. 2. Amount of land. 3. Location, drainage, etc.
Secure seed or plants	1. Varieties needed. 2. Where they can be secured. 3. Amount needed.
Secure manure or fertilizer	1. Kinds and amounts for particular crops. 2. Needs of particular soils. 3. Methods of application. 4. Cost.
Prepare soil for planting	1. Time of year. 2. Implements needed. 3. Condition of soil. 4. Cost of preparation.
Plant the plants or seeds	1. Time of year. 2. Time of day. 3. Depth. 4. Distance in row and between rows.

Truck Project—Grow beans, cabbage, strawberries, sweet corn, tomatoes, etc.

(Continued)

Activity Steps	Knowledge Required
6. Cultivate the crop	1. How soon after planting. 2. Frequency. 3. How soon after a rain. 4. Depth for particular crops. 5. Implements to use.
7. Protect from diseases and pests	1. Insects and pests common to particular crop. 2. Method and materials to control.
8. Harvest the crops	1. Time to harvest different crops. 2. Method.
9. Sell the product.	1. Preparation for market. 2. Market demands. 3. Market price.

Reference—Pennsylvania State College—Bulletin—76.

Poultry Project—Grow Chicks

Activity Steps	Knowledge Required
1. Select a breed	1. Kinds of breeds—advantages and disadvantages. 2. Adaptation of particular breeds to particular needs. 3. Personal fancy.
2. Secure eggs	1. Number of eggs needed. 2. Where eggs may be secured. 3. When to secure eggs. 4. Cost.
3. Make and place the nest	1. Materials best for nests. 2. Size, shape of nests. 3. Best location for a nest.
4. Set the hen	1. What constitutes a good "sitter". 2. How to determine above. 3. Time of day to set hen. 4. Number of eggs per hen.
5. Care for the sitting hen	1. Food requirements. 2. Disease and lice prevention.
6. Care for the hatch	1. When to expect hatch. 2. Attention required while hatching.
7. Prepare coop for chicks	1. Materials to be used 2. Size of coop. 3. Protection from rodents and animals. 4. Disinfectant methods. 5. Location.

Poultry Project—Raise Chicks

(Continued)

Activity Steps	Knowledge Required
8. Take the hatch from the nest	1. How soon after hatching. 2. Method of handling. 3. Time of day. 4. Treatment for lice.
9. Feed the young peeps	1. Time for first feed. 2. Kinds and amount of first feed. 3. Feeding methods for first two weeks.
10. Feed and care for growing chicks	1. Feeding methods for growing chicks. 2. Importance of cleanliness, regularity, etc.
11. Dispose of surplus stock	1. Best age for selling surplus stock. 2. Markets best for particular product.

Reference—Farmers' Bulletins, U. S. Department of Agriculture, Numbers 1040, 1108, 1111.

Pennsylvania State College—Bulletins 47 and 62

Poultry Project—Keep Poultry

Activity Steps	Knowledge Required
1. Select the breed	1. Kinds of breeds—advantages and dis advantages. 2. Adaptation of particular breeds to particular needs. 3. Personal fancy.
2. Secure the birds	1. Where particular breed can be secured. 2. Approximate cost. 3. Best age for laying. 4. Purity of stock.
3. Prepare the house	1. Size house necessary. 2. Desirable location. 3. Standards for interior fixtures.
4. Feed the hens	1. Best foods for egg production. 2. Amount of feed at a feeding. 3. Methods of feeding.
5. Care and manage the flock.	1. Methods of disease prevention and control. 2. Adjuncts to feeding, for egg production. 3. Food, water, cleanliness, and regularlty as essentials in management. 4. Cost of food and management.

Poultry Projects—Keep Poultry

(Continued)

Activity Steps	Knowledge Required
6. Collection and care of eggs	1. Time to collect. 2. Method of collection. 3. Storage of eggs.
7. Sell the eggs	1. Frequency of selling for good quality. 2. Where are good markets?

References—Farmers' Bulletins—U. S. Department of Agriculture, 889, 898, 1040, 1105, 1112, 1113.

Pennsylvania State College—Bulletins 47 and 62

Pig Project—Raise and fatten pigs

Activity Steps	Knowledge Required
1. Select the breed	1. Different breeds of pigs and advantages and disadvantages.
2. Secure the pig	1. Where particular breeds can be secured. 2. Probable cost. 3. Advantage of pure bred. 4. Individual points to be considered in selecting pig. 5. Desirable age for fattening.
3. Provide shelter	1. Type of pen needed. 2. Size. 3. Location desirable.
4. Provide range	1. Size or space per pig. 2. Location. 3. Fencing requirements. 4. Crops to be grown in range.
5. Keep the pig growing	1. Proper food requirements. 2. Proper water requirements. 3. Proper exercise needed for hogs. 4. Proper health requirements.
6. Fatten the pig	1. Food, water and exercise requirements for fattening.
7. Sell the pig	1. Age to sell. 2. Condition of salable fatted pigs. 3. Price required for profit.

References—Farmers' Bulletin, U. S. Department of Agriculture—878—Swine Management.

Pennsylvania State College—Bulletin 77, Swine Feeding and Management.

Calf Project—Raise a Calf

Activity Steps	Knowledge Required
1. Select breed	1. Different breeds of dairy cattle. 2. Adaptation of breeds for particular purposes and conditions.
2. Buy a calf	1. Where desirable calf can be secured. 2. Probably cost. 3. Individual points to be considered in buying calf. 4. Advantages of pure breeds vs. grades.
3. Wean calf.	1. At what age calves should be weaned. 2. Method of teaching calves to drink from pail.
4. Feed calf	1. Necessary foods—Concentrates. roughage. 2. Frequency of feeding. 3. Amount at different ages.
5. Care for calf.	1. Importance of abundant and good food and water. 2. Importance of shelter. 3. Importance of grooming and care.

Farmers' Bulletin, U. S. Department of Agriculture—777.
Pennsylvania State College—Circular 60—Raise the Heifer Calf.

Rabbit Project—Raise Rabbits

Activity Steps	Knowledge Required
1. Select breed.	1. Different kinds of rabbits. 2. Advantages and disadvantages of each.
2. Secure rabbits.	1. Where particular breed may be secured. 2. Number desired. 3. Probable cost.
3. Make a hutch and pen.	1. Desirable size. 2. Materials needed. 3. Method of construction to provide convenience and protection.
4. Feed and care for rabbits.	1. Necessity of proper food. 2. Necessity of pure water. 3. Necessity of cleanliness. 4. Proper handling.
5. Mate rabbits.	1. Age of mating. 2. Selection of mate. 3. Frequency of mating.

Rabbit Project—Raise Rabbits

(Continued)

Activity Steps	Knowledge Required
6. Wean young rabbits.	1. Age of weaning. 2. Food for young rabbits—kinds and amounts.
7. Sell surplus stock.	1. Demands of market. 2. Reliability of buyer. 3. Preparing rabbits for shipment.
8. Crate for shipment	1. Requirements of good shipping crate. 2. Where secured.

Reference—Farmers' Bulletin. U. S. Department of Agriculture. 1090.

Bee Project—Keep Bees

Activity Steps	Knowledge Required
1. Secure a swarm	1. Where swarms may be purchased. 2. How to secure a wild swarm.
2. Secure a hive	1. Where bees can be purchased. 2. Possible cost. 3. Desirable kinds.
3. Place the hive	1. Best location for bees. 2. Distance from the ground. 3. Distance between the hives.
4. Hive the swarm	1. Equipment needed for handling bees. 2. Operations and methods of "hiving".
5. Place supers	1. When additional supers should be added. 2. Number of supers on a hive.
6. Care for during summer	1. Protect from robber bees. 2. Time of day and kind of days to examine swarm.
7. Prevent swarming	1. Condition and appearance of hood previous to swarming. 2. Location, identification and destruction of possible queen cells.
8. Remove honey	1. Time of year for honey removal. 2. Condition of swarm for honey removal. 3. Method of removal.

Bee Project—Keep Bees

(Continued)

Activity Steps	Knowledge Required
9. Protect during winter	1. Shelter necessary. 2. Ventilation needed. 3. Temperature requirements. 4. Feed requirements.
10. Care during spring.	1. Feed requirements. 2. Desirable strength of swarms.

Reference—Farmers' Bulletins U. S. Department of Agriculture—447, 961

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Boyle—Agricultural Economics—J. B. Lippincott Co., Philadelphia.

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Materlink—Life of the Bee—Dodd, Mead & Co., N. Y.

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Colvin & Stevenson—Farm Projects—Macmillan Co., New York, N. Y.

B. Bulletins.

Farmers Bulletins—U. S. Department of Agriculture, Washington, D. C.

Bulletins from School of Agriculture, State College, Pa.

Note—Write to "Division of Publications", U. S. Department of Agriculture, Washington, D. C. and ask for "list of Farmers' Bulletins."

C. Farm papers.

The Pennsylvania Farmer, Philadelphia, Pa.
The National Stockman & Farmer, Pittsburgh, Pa.
The Country Gentleman, Philadelphia, Pa.
The Poultry Item, Sellersville, Pa.
The Farm Journal, Philadelphia, Pa.

SYLLABUS IN VOCATIONAL AGRICULTURE FOR HIGH SCHOOLS

SYLLABUS IN VOCATIONAL AGRICULTURE FOR HIGH SCHOOLS

I. Introduction.

A. *The purpose.* The purpose of this course of study is to give information relative to the teaching of vocational agriculture in rural community vocational schools and in high school departments of vocational agriculture. In the preparation of this course of study, the aim has been to give only a topical outline of the different units of vocational agriculture, together with suggested lists of laboratory exercises and references. It is expected that each teacher of vocational agriculture in Pennsylvania, will be able to use the course of study to advantage in the preparation of his annual plan of work.

B. *Methods of attaining purpose.* The value of vocational agriculture in the high school depends very largely upon the methods of presenting the subject to the class. Agriculture taught from the text book has no virture beyond such as may be attributed to many other subjects. In recognition of this, there has developed during the past decade a special teaching technique for vocational agriculture. Teachers should have special preparation; classrooms, laboratories and shops should have equipment adapted to the type of work, and detailed plans should be made for recitation, supervised study, field trips, laboratory exercises, project study work, and supervision, and for visual instruction. All such detailed plans and methods may be radically different from those commonly employed in the high school or college. The recitation which formerly occupied all of the class period, should in vocational agricultural teaching average approximately one-third of the time alloted to vocational agriculture, supervised study one-third, and the various types of field, laboratory, and project work the remainder (one third). This division of time is but a rough average since there can be no definite amount of time devoted to each type of teaching. The recitation, the supervised study, the field trip, the laboratory exercises, the project, and visual instruction should each be taken up as the need arises and continued until finished or until some more pressing need demands the attention of the class. There may be a temptation resulting from this organization of the class time. Teachers, who fail to plan their work; may find that the members of the class follow the line of least resistance. The result of such inactivity on the part of the teacher may be that the work will be taught in haphazard manner. Because of the limited amount of organized subject matter, careful planning and organizing in order to cover essentials will be very necessary in the teaching of vocational agricultural subjects.

The teaching plans for any one course, which should be prepared before the teacher is justified in proceeding to teach the course, should include, first, a definite statement of the general aims and objectives to be attained in the course; second, a general point of view and attitude from which the teacher purposes to direct the activities of the class; third, an outline of the subject matter arranged according to seasonal sequence, with time allotments suitable to the needs of the community and fourth, lesson plans for at least the first teaching unit.

While it may be desirable to have lesson plans worked out for each lesson in the entire course at the beginning, it is not always practicable to do so. From the point of view of teaching efficiency, it is only necessary that lesson plans be prepared for a teaching unit before the actual teaching of it begins. As a rule, each general division of the subject matter in a course should constitute a teaching unit, and should vary in number of lessons according to its importance and amount of subject matter available. The aim for each teaching unit should usually be stated as one of the general aims of the course. In the lesson plan for any one class period the aim of that particular lesson should be clearly formulated in the mind of the teacher. One can never be sure that he has an aim definitely formulated until it is written down. The teacher should therefore write, as the first step in making his plan, the aim of each lesson. The second step should be to determine the subject matter to be included under the topic and which will best develop the aim he has for the lesson. The third essential step of the lesson plan should be to determine the method procedure—the preparations necessary for the teacher to make, the kind of assignment: the manner, place and time of preparation, and work on the part of the pupils; and an estimate of time to be devoted to each recitation, supervised study, laboratory, field, and project work. The more clearly the aim of the lesson is formulated the more easily it is possible to determine the type of class exercise most suitable for accomplishing the aim. Then again, the more clearly one defines the different types of class exercise used, the more easily can the exercise be planned in accordance with the aim of the lesson.

1. *The Recitation.* The academic teacher's day is made up of periods labeled with the name of subject or section. This means that each period is set aside for a group of pupils, whom the teacher meets as a whole. He develops the lesson, lays out additional work and conducts written tests and other group activity. It is the only time assigned to the teacher for that particular subject. This period commonly called the recitation period, is his only chance to teach the subject to the group of students. Such a plan has been unsuccessfully used by many school systems in the teaching of agriculture. As

previously indicated, in the teaching of vocational agriculture, the teacher should be assigned time for the execution of the three distinct types of work.

a. Group recitation.
b. Supervised study, including supervised project study.
c. Laboratory and field work.

These are the group activities. Such activities are both economical and social. Project work and other phases of individual instruction are discussed elsewhere.

The following additional types of activities are suggestive:

a. Group review of fundamentals.
b. The recitation.
c. The assignment.

The public school system is sometimes criticized for teaching nothing thoroughly. It is claimed that even fundamentals are forgotten. Some parents are of the opinion that if fewer things were taught, their children would get the work more thoroughly. The difficulty probably does not lie in the number of things which are attempted but in the method of teaching. Relationships are not established. A bit of information or "unit of instruction" has most value if it is related to the general facts of the universe.

The recitation period should be a time for the consideration of questions which concern every member of the class. The teacher's success in the recitation is measured by how well he succeeds in having every member of his class busy every minute. It is not desirable that every member of the class be talking, drawing or demonstrating all the time, but it is desirable that every member be mentally active all the time. Pupils who are slow should be given specific attention during the supervised study period . Anything which tends to break the united progression of attention of the whole group should be eliminated.

The teacher's part in the recitation is to keep the class on the problem. This may be accomplished through skillful questioning. Questions should not suggest the answer, but should direct the student along the line of thought. The teacher should hold the pupil responsible for what has been said. Everything presented in the recitation is for the group.

2. *Assignments.* Carefully planned lessons should mean good assignments. The assignment has an art of its own. Many clever teachers however fail to master it. It requires a peculiar kind of good judgment. Some teachers are vague, saying "Read these references on ensilage for dairy cattle" or "Report tomorrow the trip to the elevator" or even the inexcusable "Take the next ten pages" or "bul-

letin so and so". When these teachers come to the checking period they find that the assignment has not been understood alike by any two members of the class. The whole class may have missed the really important part of the assignment and concentrated upon an illustration more or less irrelevant or upon a section requiring more or less memory work. Or, the part of the reading that is best written or the part of the trip that was most picturesque may seem to them to be of the most importance. Teachers who make assignments of this kind have to do most of their teaching in the review. When they begin in the course of presentation, to develop relationships, they find that a number of by-paths lead off from the central thought. Vague assignments may mean that the assignment is postponed until the lesson reaches the recitation stage of development. It is perhaps no worse to be vague than to be so explicit and minute as to rob the pupil of seeing thought develop in his own way. It takes practice and skill to make assignments definite.

3. *Supervised Study.* Supervised study has proved a success in many schools. There is reason to think that its use will greatly improve the character of the teaching of agriculture.

Exact and constant discipline is essential to success in supervised study. It is perhaps better to err on the side of repression than on that of freedom. If talking, moving about, looking at each other's work, borrowing and returning, and other methods of visiting are permitted, the plan may fail. The teachers should be very quiet. His suggestions should be given in an undertone and nearby pupils not invited to listen or take part in the conversation. After the study habit has been established among the pupils the teacher should be able to give much attention to personal help. The training in concentration is one of the most valuable results of the supervised study period. Pupils should put aside all other work and follow a definitely prepared plan of work.

The teacher must not help too much. This is easily done with a small class. Self-effort is the end sought. During the period devoted to supervised study the aim should be mastery of subject matter.

As the teacher passes from desk to desk in the supervised study he will meet one of the real problems of teaching. He should see the student who needs help and should give help at the right time to prevent continued waste of energy. Sometimes he can tell from the notes, or map, or drawing which the pupil has begun, what the difficulty is. Sometimes he must ask questions and try to discover whether the trouble is in previous studies or the present one.

The teacher may ask himself some such questions as the following to determine what he needs to do. Does the pupil understand the problem? Does he use recognized study aids? If so, does his work show that he grasps the leading ideas? Is he using references relatedly or just reading them? How is he trying to fix the ideas?

The teacher should act upon the information he is able to secure about the procedure of the pupil and correct improper methods. Acquaintance with the individuals of the class and an intelligent amount of attention given to study should enable the teacher to judge fairly accurately how each student is progressing.

4. *Field Trips.* In the study of vocational agriculture the farm should be considered the great laboratory since the problems to be observed and solved are problems concerning farm crops, farm animals, farm buildings, etc. These cannot be brought within four walls for instructional purposes. They are studied most advantageously in their natural surroundings and settings.

It is the purpose of a course in vocational agriculture to give pupils a working understanding of agriculture and its cultural and economic principles and practices. Herein is found sufficient justification for devoting considerable time to field trips. Frequently the teacher states but vaguely the purpose of a field trip and seldom organizes and plans definitely for such a trip.

A field trip requires a great deal of planning and preparation on the part of the instructor if it is to be time well spent. It should mean more than a lark or a jaunt into the country. Observations can be made going to and from the destination of the trip. Part of the instructor's preparation should consist of going over the ground a day or two in advance of the day for the trip to make detailed arrangements.

It is not wise to make a field trip on the slightest pretext for it. Field trips consume a great deal of time and should not therefore be a daily occurrence. Some trips must be delayed and the necessity for others must be foreseen or anticipated. The object of a field trip is really cumulative and one trip should be made to serve the needs of several. There should always be a major purpose in taking a trip. For example in the study of alfalfa a suitable time to study it outdoors would be at the time of cutting and harvesting to observe the stage of growth and method of harvesting. There are many places of interest in any farming community to which profitable field trips can be made. There is a successful poultry farm or dairy farm in almost every prosperous farming district. It is not at all unusual to find out that boys know very little about the operation of the farms of their immediate neighbors. The teacher should make arrangements with the owner or farmer to tell the boys how he conducts his business and to answer their questions. The sight of a large, uniform, productive flock of hens in properly appointed quarters, points the way to the boy and enlarges his vision of the possibilities of farming. Such a trip will establish a definite point of contact between the interests of the farm and those of the school.

Trips to boys' projects should be frequent. Many boys see only their own projects. There is usually one boy's project which greatly excels those of his schoolmates. The class should make a study of one or two outstanding projects as well as investigate the causes of project failures. Such a trip will serve as a project study and will be following up that particular project. The class should be held as responsible for accurate notations and facts observed as for subject matter obtained in a recitation.

5 *Laboratory exercises.* Many phenomena of the farm such as texture of soils, effect of lime, growing of legumes, etc., can be observed in the laboratory. Field trips are often hampered or prevented by weather conditions. Laboratorary exercises and experiments can usually be performed, regardless of the weather. Much of this work should therefore be done during the winter when very few field trips can be made. The material can and should be collected during the summer. Occasionally the laboratory work should consist of individual or of all group experiments. Where adequate facilities and equipment are lacking, class demonstrations are resorted to. If a class of puils interested in the phenomenon of the demonstration and is required to write it up afterwards, a demonstration can be made almost as valuable as the individual experiment. To determine the water holding capacity of soils may be taken as an example. The teacher of agriculture can set up this experiment with the assistance of the class and explain the different steps, using different kinds of soils. The demonstration method does not train the boy in the technique of laboratory practice. This accomplishment the teacher can well afford to sacrifice for an economy of time and particularly of equipment. There are numerous instances in which the demonstration method of instruction justified itself. It is expected that each pupil will report in a note book, provided for that purpose, each experiment or exercise performed. A list of suggested laboratory exercises, demonstrations and field trips are included in the outlines of unit courses. The following outline may prove suggestive in the preparing of such note books.

a. Steps.
    (1) The date of performing the experiment or exercise.
    (2) The name of experiment or exercise.
    (3) Object.
    (4) Material.

(5) Procedure.
(6) Data.
(7) Remarks and conclusions.

6. *The project.* The term "project" in agriculture has been used, at least since the passage of the Adams Act to designate a unit of agricultural work. In vocational agriculture the term represents the practical application of the information obtained in the classroom. As is evident the classroom instruction and the project work should correlate closely.

While the aim of a project will vary with the type of project, the following aims are typical of all projects:

a. Different aims.
   (1) To offer educational development to the boy through agricultural activities.
   (2) To offer an opportunity for the correlation of the practical and the theoretical.
   (3) To motivate and vitalize the study of vocational agriculture.
   (4) To furnish an opportunity for a remunerative activity.
   (5) To develop manipulative skill.
   (6) To develop a keener appreciation and the proper attitude toward farming as a vocation.
   (7) To give the individual student an opportunity for individual development.
   (8) To train for farming.

7 *Types of projects.* Projects may be of several types, namely production, improvement, experimental, farm management and farm experience. By a production project is meant a project in which the efforts of the pupil result in material returns. The growing of several acres of corn is an example. The beautifying of the farm and grounds is a typical improvement project, while the growing of new varieties of wheat would be an experimental or trial project. The taking of an inventory, the keeping of accounts, and the management of the home farm are typical farm management projects. By a farm experience project is meant actual service on the farm for at least one season. One project extending over a period of at least six months should be required of each pupil during each of the four years. In addition to the completion of such project each pupil may complete a number of improvement and experimental projects, or may continue to carry on the project begun during a previous year. For example a pupil may become so intensely interested in a poultry project the first year that he will desire to develop the project throughout the four years. The project for a given year should in all cases

correlate with the theory being taught that year. Where the fourth year agricultural work is taken by a student he must have completed at least six months supervised practical work before being allowed to graduate. This project, if a farm accounts project, may however be begun the previous year.

8. *Typical production projects.* The following list of typical production projects may prove helpful to pupils in making selections:

a. Poultry

(1) The keeping of one hundred hens for egg production.
(2) The raising and marketing of 250 chicks.
(3) Hatching and selling 1000 day old chicks.

b. Vegetable Gardening

(1) The growing of a half acre of truck.
(2) The growing of a half acre of tomatoes, cantaloupes, beans, etc.
(3) The growing of an acre of cabbage, sweet corn or potatoes.

c. Farm Crops

(1) The growing of five acres of corn.
(2) The growing of ten acres of wheat, oats or buckwheat.
(3) The growing of an acre of tobacco.

d. Dairying

(1) Care of at least five dairy cows.
(2) Rearing pure-bred heifers.
(3) Keeping records on twenty-five dairy cows.

e. Animal Husbandry

(1) Care of twelve pure bred ewes.
(2) The care and feeding of five beef cattle.
(3) The rearing and fattening of ten pigs.

f. Fruit Raising

(1) The planting and care of a two acre orchard.
(2) The rejuvenating of fifty trees.
(3) The planting and care of a half acre of berries.

g. Farm Management

(1) Keeping records on home farms.
(2) Completing a farm experience project.
(3) Managing a farm.

Note: It will be noted that each of the production projects listed is of sufficient size to require considerable time and effort on the part of the pupil. In addition to the necessary time spent in the class room preparatory to the practical phase of the work, it will aslo be necessary for the pupils to do actual practical work. It is expected that the pupils will devote from 300 to 600 hours to such actual practical work each year.

Projects may be either individual or group projects. Individual projects are usually conducted on the home farm, while group projects may be conducted on the school grounds. Individual projects are however best adapted to Pennsylvania conditions because:

a. Points in favor of individual projects.
  - (1) Neither skill nor managerial ability, both of which are essential, can best be secured by observing the work of others.
  - (2) Actual farm conditions are well adapted to project work, due to the fact that a project carried on under such conditions will consist of a series of more or less independent units of productive work.
  - (3) The individual or home project fits in nicely with the usual farm activities of the boy.
  - (4) Pupils are enabled to carry on the project work on the home farm with very little inconvenience.
  - (5) Home project work offers an opportunity for individual achievement.

9. *Successive steps in project work.* The steps necessary for completion of a project are:

(1) Preliminary study.
(2) Selection.
(3) Plan, including preparation and study outlines.
(4) Work.
(5) Reports.
(6) Supervision.

10. *Preliminary study.* Since the project and the instruction should correlate, the preliminary project study should be limited to the study of such projects as correlate with the instruction being given. For instance, if the class is being taught poultry and vegetable gardening, only poultry and vegetable garden projects should be considered. The preliminary project should be based upon:

a. Points.
  - (1) An agricultural survey of the community. Because of the unlimited amount of agricultural subject matter available, an agricultural survey is necessary in order to determine the subject matter to be taught in any given community.
  - (2) The possibility of correlating the project with subject matter to be taught.
  - (3) The adaptability of projects to local condition.
    - (a) Soil.
    - (b) Climate.

- (c) Market.
- (d) Size.
- (e) Home farm.

(4) The comparison of projects adapted to local conditions.
- (a) Profit.
- (b) Desirability.

11. *Selection.* Because of the fact that there is an unlimited amount of agricultural subject matter available, and since the project work should be based upon such subject matter as is adapted to a given community the success of the work will depend largely upon the selection of projects. The following are points which should be given due consideration in the selection and development of all projects.

a. Points.

(1) Each pupil must complete at least one major project each year.

(2) The project and the subject matter being taught must correlate closely.

(3) The project should fit in with the work of the home farm, and be of sufficient size to be a real farm business proposition.

(4) Projects should be selected as early in the year as possible.

(5) The project should be selected by the pupil with the approval of the parent and teacher.

(6) The interest of the pupil should largely determine the selection of the project.

(7) The full responsibility of the project should be assumed by the pupil.

(8) The initial cost in starting a project should be borne by the pupil. If it is necessary for a boy to secure financial assistance from his father in order to take care of the initial expense, of such financial assistance should be acknowledged according to customary business methods. This will frequently involve the giving of a note by the boy. The amount of the note and the interest thereon should be paid from the proceeds of the project.

(9) Definite plans for the development of the project should be prepared by the pupil.

(10) In so far as is possible, the work of the project should be performed by the pupil. Such work should provide for new experiences and skills.

(11) The profit accruing from the project should go to the pupil.

(12) No projects should be accepted as complete until all records have been submitted.

12. *The plan.* Because of the fact that the project must be adapted to the needs of the individual pupil there should be a definite plan for each individual. Such a plan should be prepared by the individual pupil, with the assistance of the teacher. Such a plan should include:

a. Steps.
  - (1) A definite statement of purpose.
  - (2) Proposed procedure.
    - (a) Project study.
    - (b) Initial outlay of capital.
    - (c) Schedule of work.
    - (d) Disposal of product.
  - (3) Methods of procedure, or actual work.
  - (4) Records and results.

The statement of purpose should enable the pupil to work with some one definite end in view. The project study should include a detailed study of the steps involved in the development of the project. A detailed outline for project study should be prepared early in the school year. Each pupil should, with the assistance of the teacher of agriculture, prepare a separate outline, which outline should correlate with his individual project. Such outline should include, among other things, a preliminary survey of the project, and detailed outline of such subject matter as is essential to the successful completion of the project. Specific book and bulletin references to each phase of the project should be indicated.

As soon as the outline is completed, each pupil should spend some time each week in studying the references. All references studied should be summarized in a note book.

In conducting project study the teacher should take into account the individual differences and, provided each pupil has a different project, should take into account, when setting minimum standards and in assisting pupils, the individual capacities of pupils.

b. Each project study period may be divided into two parts.
  - (1) The study of individual projects.
  - (2.) Class discussion of individual projects in which general applications are made. Reports on the progress of individual projects may also be made to advantage.

13. *Procedure or actual work.* Ordinarily, instruction, project study, and project work may be carried on to the best advantage at the same time. This, of course, is not always possible. As previously stated each student enrolling for vocational agriculture should be required to complete at least six months' supervised practical work, before credit for the work in vocational agriculture is given. Such work may be obtained either through supervised practical work on the farm, or through the completion of a definite project. In either event the work should be done by the individual student.

14. *Reports and results.* Before any pupil is entitled to credit in vocational agriculture he should have submitted to the teacher of that subject a report on his project. Such report should include statements relative to actual expenses, receipts and profit, a summarized project report and a brief memorandum on work accomplished. The memorandum should include a brief summary of reports made in class and conclusions drawn from results obtained. In the preparation of the memorandum, the teacher should give only such assistance as will enable the student to prepare a clear-cut brief report.

15. *Supervision.* In order that project work may be given detailed supervision all teachers of vocational agriculture should be employed on the twelve months' basis. During the summer months each project should be visited weekly or as often as is necessary for the best possible supervision. The following points may be observed to advantage, by teachers of vocational agriculture.

a Points.

(1) Supervision should begin with the selection of the project.
(2) Definite supervision should be given throughout the school year as well as during the summer months.
(3) Projects should be visited as often as there is need for supervision.
(4) A means of transportation should be provided.
(5) Supervision should enable the teacher to detect weaknesses of the project and suggest remedies.
(6) Pupils may, to advantage, visit the projects of other members of the class.
(7) Project supervision should include assistance in preparing project records.
(8) Project supervision, as such, ends with the completion of a project; the teacher should assist the pupil in making applications to other farm enterprises.

(9) A definite record of each project supervised should be kept by the teacher.

16. *Results of evaluating project work.* The one phase of project work which has been most neglected in the past is the matter of evaluating projects. Practically every other phase of school work has detailed plans for determining results. As yet, but one state, Illinois, (See Illinois State Board of Education Bulletin Number 18). has attempted by means of a score card to measure the success of project work. It is realized that after all a score card is merely a guide and not to be relied upon too much.

17. *Visual Instruction.* There is an increasing demand for more effectiveness and more simplicity in giving information. In no subject in the curriculum are the possibilities so great for visualization of the work as in vocational agriculture. The teacher should make use of graphic methods and visual devices in presenting facts. There are available, at little cost, hundred of printed pictures of various sizes which should be collected, mounted and classified for ready use. There are in circulation, a number of valuable charts and more may be made. Stencils aid in giving instruction. There is a great field of real things about the teacher which may be used in laboratory and field work. Many of these real things can be collected and used in giving instruction. A large amount of useful material is made available by use of the projector and the motion picture machines.

The Rural Life Department of the State College is assembling a comprehensive set of visual materials in the form of head samples of grains, charts, lantern slides, and motion picture films. This material is organized to lend itself to instruction in vocational agriculture. The service is free to schools of the State.

II. The Curriculum

A. Basis.

The curriculum has been prepared with the needs of the individual as well as the group in mind. It has been made sufficiently broad to give opportunity for both general and specific instruction in vocational agriculture. Only such subjects as are of vital importance in the State have been included. Justification for including certain subjects is clearly indicated by the following:

1. *Plant production subjects.* The value of the nine leading crops, wheat, corn, rye, oats, buckwheat, barley, tobacco, potatoes and hay, produced in Pennsylvania during 1920 was $316,774,580. The State is well adapted to a large number of crops. Every suc-

cessful farmer raises sufficient vegetables for his own use annually. Approximately $50,000,000 worth of vegetables are produced annually in the State.

The value of the apple crop for 1920 has been estimated at $18,742,500; the peach crop at $4,133,805 and the pear crop at $1,153,300 or a total of $24,029,605 for the three crops.

One phase of agriculture which has perhaps been given but slight attention in Pennsylvania is ornamental gardening. A study of this subject enables a student with little extra work and thought to beautify the home grounds. Most farmers are anxious to make the farm home attractive but need assistance in planning. Such assistance may best be given through the teaching of ornamental gardening.

On many farms there is some acreage which is too hilly to be farmed with profit. Such land should be planted to trees. Thousands of acres in Pennsylvania have been stripped of timber and now lie idle producing nothing but underbrush for an occasional forest fire. These hillsides should be re-forested. There was a time when Pennsylvania exported lumber. Now the expense of imported lumber runs into millions of dollars. The extent of forests is closely linked up with the success and permanency of agriculture. Wooded hills and mountains prevent destructive floods in the valleys and lowlands and serve as reservoirs in periods of drought.

As is evident the teaching of the different phases of plant production is essential to a well rounded course in vocational agriculture.

2 *Animal husbandry subjects.* According to 1920 statistics, the number of horses in Pennsylvania at that time was estimated at 539,957 with a value of $55,141,507; the number of mules at 45,932, with a value of $5,738,493; the number of cattle, other than cows, at 575,578, with a value of $22,470,350; the number of sheep at 831,435 with a total value of $5,381,145; the value of wool at $1,520,320; and the number of hogs at approximately 1,081,098, with a total value of $17,467,635. The total estimated value of the horses, mules, cattle, sheep and swine was $174,085,369.

The importance of dairying in Pennsylvania is shown by the fact that in 1920 there were 897,626 dairy cows with a value of $67,886,238. The value of dairy products for the year is estimated at $150,000,000. These facts, together with the fact that good markets are convenient, make dairying one of the leading industries in the State. While the study of dairying is especially adapted to some sections of the State, it is needed in all sections.

In 1920, Pennsylvania had a total of approximately 15,226,961 fowls. The value of eggs produced annually has been estimated at $50,000,000. Due to the fact that the State has unusually good markets for poultry, and that poultry raising is well adapted to Pennsylvania, poultry offers opportunity for profitable study.

Because of the importance of animal husbandry in Pennsylvania, a study of this phase of agriculture is equally as essential as is the study of plant production.

3. *Farm Management and farm accounts.* No farmer can be said to be a successful farmer unless he has developed managerial ability. In order to do this he must have developed the ability to correlate all farming activities. He must be able to see each phase of farming in its relation to every other phase. Through a study of farm management pupils learn the interrelation of the elements that enter into farming as an occupation.

No farmer can be classed as a successful farmer who merely produces crops and animals. He must have been able to produce such crops and animals at a profit. In order to determine his profit he must practice some system of keeping farm accounts. The aim in the teaching of farm accounts as a part of the agricultural instruction offered is to develop a practical application of the principles and theories of farm accounts in order that accounts may be kept intelligently on the home farm.

Farm accounts, in so far as the study relates to project work, should be taught each year. Such work should at all times be correlated with the phase of technical agriculture being taught.

4. *Rural sociology.* The farmer must be able to correlate the different phases not only of farming but also of community life. The teaching of the interrelation of the various rural activities should be the principal aim in the study of rural sociology in vocational schools and departments. Rural law should be included as a part of the course in rural sociology and should include a study and application of only such laws as are directly related to rural life.

5. *Farm shopwork.* By farm shop work is meant such repair and construction work as is ordinarily done by farmers as a part of their farm work. Farm shop work should be taught in each year of the agricultural course. The work given should be such as correlates closely with the technical agriculture being given at the time. For example, when poultry husbandry is taught, the farm shop work should be on poultry house construction and making or repairing poultry house conveniences. Only such objects as are made or repaired by successful farmers in pursuit of their vocation, should be given as farm shop work.

The mechanical drawing taught in connection with farm shop work should aim to accomplish the following:

a. Aims.

(1). To teach pupils to read blue-prints and working drawings.

(2) Teach pupils to make free-hand working sketches, not to scale, but containing all necessary views, dimensions and notes.

(3) Teach pupils how to make out bills of materials, and write specifications to accompany sketches.

(4) Teach pupils to make working drawings to scale.

b. *Agricultural Curriculum for Rural Community Vocational Schools and Departments.*

Vocational Subjects (½ day)	Units credits	Academic Subjects (½ day)	Units credit
First year			
	x		x
Related Science	.3	English	1
Poultry	.5	Civics	1
Vegetable & Ornamental Gardening	.5	Health Instruction	***
Farm Shop, including Mechanical Drawing	.2	*Elective	1
Agricultural Project	.5		
	2		3.
Second year			
Farm Crops	.7	English	1
Animal Husbandry or Dairying	.6	European History	1
Farm Shop	.2	Health Instruction	***
Agricultural Project	.5	*Elective	1
	2		3.
Third year			
Dairying or Animal Husbandry	.6	English	1
Fruit Production & Forestry	.7	Chemistry or Physics	1
Farm Shop	.2	Health Instruction	***
Agricultural Project	.5	*Elective	1
	2.		3.
Fourth year			
Farm Management and Farm Accounts	.6	English	.5
		Problems of Democracy	.5
Rural Sociology & Rural Law	.7	Health Instruction	***
Farm Mechanics	.2	American History	1
Agricultural Project (Farm Accounts)	.5	*Elective	1
	2.		3.

*Electives may or may not be taken during the first two years. When pupils demonstrate their ability to carry more than two academic subjects they are urged to do so. In this case, it is suggested that American History be taken as an elective in the third year and another subject the fourth year. If a pupil elects but two years of vocational agriculture it will be necessary for him to complete additional academic subjects the last two years. Reference should be made to the Manual for High Schools, issued by the State Department of Public Instruction, in constructing a curriculum containing the necessary courses for high school graduation.

***Required. May count one-fifth unit each year toward high school graduation.

xUnits credit toward high school graduation.

Note: High schools may offer either a two or four year course. The daily program of studies shall be arranged so that half the day will be devoted to agricultural work. The vocational group shall be under the jurisdiction of the teacher of agriculture for a full half day. Where classes are small they should be combined. This may be accomplished by alternating the work of the different years.

1. Suggested Weekly Schedule of Agricultural Classes

First Year

First Term

Time	Monday	Tuesday	Wednesday	Thursday	Friday
9:20—10:00 1:20— 2:00	Supervised Study***	Supervised Study	Supervised Study	Gardening†	Supervised Study
10:00—10:40 2:00— 2:40	Poultry	Related Science	Poultry	Gardening†	Poultry
10:40—11:20 2:40— 3:20	Related Science*	Poultry*	Farm Shop**	Poultry*	Farm Shop**
11:20—12:00 3:20— 4:00	Related Science*	Poultry*	Farm Shop**	Poultry*	Farm Shop**

Second Term

Time	Monday	Tuesday	Wednesday	Thursday	Friday
9:20—10:00 1:20— 2:00	Supervised Study	Supervised Study	Supervised Study	Related Science*	Supervised Study
10:00—10:40 2:00— 2:40	Gardening†	Related Science	Gardening†	Related Science*	Gardening
10:40—11:20 2:40— 3:20	Farm Shop*	Gardening*	Farm Shop*	Gardening*	Poultry
11:20—12:00 3:20— 4:00	Farm Shop*	Gardening*	Farm Shop*	Gardening*	Poultry

†Includes both vegetable and ornamental gardening.

*Laboratory, demonstration or field trip period.

**Laboratory work, including mechanical drawing.

***The periods devoted to supervised study thruout this schedule should include the necessary project study.

Second Year

First Term

Time	Monday	Tuesday	Wednesday	Thursday	Friday
9:20—10:00 1:20—2:00	Supervised Study	Supervised Study	Supervised Study	Supervised Study	Supervised Study
10:00—10:40 2:00—2:40	Animal Husbandry†	Farm Crops	Animal Husbandry†	Farm Crops	Animal Husbandry†
10:40—11:20 2:40—3:20	Farm Crops*	Animal Husbandry†*	Farm Shop*	Animal Husbandry†*	Farm Shop*
11:20—12:00 3:20—4:00	Farm Crops*	Animal Husbandry†*	Farm Shop*	Animal Husbandry†*	Farm Shop*

Second Term

Time	Monday	Tuesday	Wednesday	Thursday	Friday
9:20—10:00 1:20—2:00	Supervised Study	Supervised Study	Supervised Study	Supervised Study	Supervised Study
10:00—10:40 2:00—2:40	Farm Crops	Animal Husbandry†	Farm Crops	Animal Husbandry†	Farm Crops
10:40—11:20 2:40—3:20	Animal Husbandry*†	Farm Crops*	Farm Shop*	Farm Crops*	Farm Shop*
11:20—12:00 3:20—4:00	Animal Husbandry*†	Farm Crops*	Farm Shop*	Farm Crops*	Farm Shop*

†Animal husbandry or dairying.

*Laboratory, demonstration or field trip period.

Third Year

First Term

Time	Monday	Tuesday	Wednesday	Thursday	Friday
9:20—10:00 1:20—2:00	Supervised Study	Supervised Study	Supervised Study	Supervised Study	Supervised Study
10:00—10:40 2:00—2:40	Dairying	Fruit Production	Dairying†	Forestry	Dairying†
10:40—11:20 2:40—3:20	Dairying†*	Farm Shop*	Forestry*	Farm Shop*	Fruit Production*
11:20—12:00 3:20—4:00	Dairying†*	Farm Shop*	Forestry*	Farm Shop*	Fruit Production*

Second Term

Time	Monday	Tuesday	Wednesday	Thursday	Frida
9:20—10:00 1:20—2:00	Supervised Study	Supervised Study	Supervised Study	Supervised Study	Supervised Study
10:00—10:40 2:00—2:40	Fruit Production	Dairying	Fruit Production	Dairying	Forestry
10:40—11:20 2:40—3:20	Dairying*†	Farm Shop*	Forestry*	Farm Shop*	Fruit Production*
11:20—12:00 3:20—4:00	Dairying*†	Farm Shop*	Forestry*	Farm Shop*	Fruit Production*

†Dairying or animal husbandry.

*Laboratory, demonstration and field trip period.

NOTE: The distribution of time between dairying, fruit production and forestry may, in some communities need to be revised because of the predominating importance of one of these phases of agriculture. Should a change be desired, submit proposed changed schedule to the Department for approval.

Fourth Year

First Term

Time	Monday	Tuesday	Wednesday	Thursday	Friday
9:20—10:00 1:20— 2:00	Supervised Study	Supervised Study	Supervised Study	Supervised Study	Supervised Study
10:00—10:40 2:00— 2:40	Rural Sociology	Farm Mechanics	Rural Law	Farm Mechanics	Rural Sociology
10:40—11:20 2:40— 3:20	Farm Accounts Project*	Farm Mechanics*	Rural Sociology*	Farm Mechanics*	Farm Accounts Project*
11:20—12:00 3:20— 4:00	Farm Accounts Project*	Farm Mechanics*	Rural Sociology*	Farm Mechanics*	Farm Accounts Project*

Second Term

Time	Monday	Tuesday	Wednesday	Thursday	Friday
9:20—10:00 1:20— 2:00	Supervised Study	Supervised Study	Supervised Study	Supervised Study	Supervised Study
10:00—10:40 2:00— 2:40	Farm Management†	Farm Management†	Farm Management†	Farm Management†	Farm Management
10:40—11:20 2:40— 3:20	Rural Sociology	Farm Management*	Rural Law	Farm Management*	Rural Sociology
11:20—12:00 3:20— 4:00	Farm Accounts Project	Farm Management*	Farm Accounts Project	Farm Management*	Farm Accounts Project

*Laboratory.

†Includes farm accounts.

C. Part-time Instruction

Part-time instruction of two types, short unit courses and evening classes, may be given to advantage.

1. *Short unit courses.* In every farming community there are boys and young men who, because of home conditions or financial circumstances, are not able to avail themselves of the full-time course in vocational agriculture. They will however, be able to devote a few weeks during the winter to instruction if a special course is available. For this reason, short unit courses should be offered in every vocational school and department of vocational agriculture.

These short unit courses should be offered during the winter months when the farmers' work is slack. They may extend over a period varying from two weeks to three months, depending upon the wishes and needs of those taking the courses, and may cover either half or full school days during that period. Announcement of such courses should be made early in the school year so that those who wish to avail themselves of this opportunity can plan their work accordingly.

Short unit courses should never be of a general nature but should be confined to some special phase of agricultural production, based upon the problems and experiences of those taking the work. The alert teacher of agriculture will so arrange the courses that they will be truly vocational, training the young men in those skills, and giving them that knowledge which will give a sufficient mastery of the phase of farm operation undertaken.

For example, there might be a short course covering a period of several weeks in which, by agreement of the pupils, such subjects as farm accounts, feeding of dairy cows, tractor or gas engine operation would be offered. A course of study should then be outlined for each of these subjects. Then through reading, recitation, and lecture, the fundamental principles should be developed. When these principles are understood, further information should be given and skill developed through the application on the home farms of the pupils. This is particularly true in farm accounts and the feeding of dairy cows. In the tractor or gas engine operation courses, arrangements should be made by the school for the use of machines belonging to either farmers or dealers of the community.

Some form of supervised practice should grow out of the short course instruction. Since the instruction grows out of the problems that have come up in the experience of these farmers it should be the duty of the supervisor to carry on this form of follow-up work and see that the instruction of the short course produces results. This may be done by having the work carried on, according to the instruction received. The unit courses outlined herein may be adapted to this type of instruction.

2. *Evening classes.* Evening classes have been conducted for years under various names. They are conducted largely for mature men who are managing and operating farms. These classes are conducted one or two nights a week usually for a period of from six to eight weeks during the winter months. The instruction is based upon the problems of the farmers.

Here again the needs and wishes of those enrolling for the classes should be the determining factor in the selection of courses. The teacher of agriculture should prepare a definite course of instruction before beginning the class meetings. At each meeting a new part of the subject should be developed either by the teacher himself or through reports on reading, experiments or experiences on the part of members of the class, or by talks by farmers from a distance, the county agent, or college specialist.

The courses should be complete and thorough, but not too inclusive. The subject matter should be made to function immediately by being so presented as to be usable, and by having the members of the class agree to adopt the new methods suggested. The unit courses outlined herein may prove helpful in planning for this type of instruction.

Courses in farm accounts and the feeding of dairy cows may be given. Too many points should not be presented at any one meeting. Only those which can be adopted by the farmers with a full understanding of principles involved should be given. The subject matter should be so complete that at the end of the course the farmer would be keeping satisfactory accounts, and properly balancing the feeds of dairy cows. In order to make the new methods a permanent part of the farmers' methods of farm operation and management, the work should be continued for some months, under the supervision of the agricultural teacher.

The equipment of vocational schools and departments of vocational agriculture should be available for use, as should also such equipment as may be borrowed or loaned from citizens of the community.

III. Necessary Equipment.

Agriculture is a combination and application of sciences. A certain amount of equipment is necessary to teach any branch of science and to teach agriculture effectively, a considerable amount is needed. For example, when the class takes up the study of dairying, such equipment as milk testers, separators, scales, etc. is needed for demonstration purposes.

A similar need for equipment exists in connection with the majority of courses in the agricultural curriculum. The purchase of equipment should follow a definite need. To purchase expensive equipment and later devise some application of it is an incorrect order of procedure. The teacher of agriculture should plan his courses before the opening of the school year and prepare a minimum list of equipment which in his opinion he must have in order to make his instruction effective.

An agricultural laboratory is needed in which to arrange and use this equipment. This room may also be used as a class room. Suggested lists of equipment may be obtained upon request from the State Department of Public Instruction.

Another room is needed for farm shop, including both iron and wood work. It is becoming more and more imperative that farmers be able to do some iron work. For this reason each school should have some equipment for each type of work. The bulk of the shop work in both iron and wood should consist of both construction and repair work. Boys should be encouraged to bring to the school shop from the farm or home, articles in need of repair. For example; a saw to be filed, or a hatchet to be sharpened.

The equipment should be sufficient to accommodate at least twelve boys. Some of the necessary tables can be made by the boys. The tools should be similar to those found on the home farm. The equipment need not be elaborate. Only such equipment as is absolutely necessary should be provided.

The natural laboratory for agriculture is the home farm. A school farm is, however, not considered a part of the necessary equipment. A school board ought to own or rent a small tract of land within a convenient distance from the school to be used in connection with the class work. There is much practical work to be done in agriculture but most of it is to be conducted by the pupil on his home farm. There are several reasons for this arrangement. A school farm is inconvenient for boys during the summer months. A project conducted on the home farm will serve as a connecting link between the school and farm in arousing the interest of parents in school work.

A collection of books, bulletins properly catalogued, and farm papers should be included in the agricultural library. Only books and periodicals which will be read should be purchased. The farm papers subscribed for should have a direct bearing upon the subjects taught, consequently the kind of farm papers will vary with the different courses of instruction.

IV. Bibliography on Agricultural Education

Betts and Hall—Better Rural Schools, Bobbs-Merrill Co., Indianapolis, Ind.

Bricker, G. A.—Agricultural Education for Teachers, American Book Co., N. Y.

Carney, Mabel—Country Life and the Country School—Row, Peterson and Co., N. Y.

Cromwell, A. D.—Agriculture and Life—J. B. Lippincott Co., Philadelphia, Pa.

Cubberley, E. P.—Rural Life and Education—Houghton-Mifflin Co., Boston.

Eaton, T. H.—Organization and Methods in Agriculture in Secondary Schools, Teachers' College, Columbia University, N. Y.

Foght, H. W.—The Rural Teacher and His Work—MacMillan Co., N. Y.

Hummel, W. B. & B. R.—Materials and Methods in High School Agriculture, The Macmillan Co., N. Y.

McKeever, W. A.—Farm Boys and Girls—The MacMillan Co., N. Y.

Nolan, A. W.—The Teaching of Agriculture—Houghton Mifflin Co., Boston.

Quick, Herbert—The Brown Mouse—Bobbs-Merrill Co., Indianapolis.
Stimson, R. W.—Vocational Agricultural Education—The MacMillan Co., N. Y.
Storm and Davis—How to Teach Agriculture—A book of Methods in this subject.—J. B. Lippincott Co., Philadelphia, Pa.

A Unit in Poultry

I. *Poultry industry.*
- A. Scope of business.
- B. Rapid development.
- C. Poultry on the farm.
- D. Intensive poultry sections.
- E. Poultry shows.

II. *Breeds and breeding.*
- A. General purpose class.
- B. Egg class.
- C. Meat class.
- D. Turkeys, ducks and geese.
- E. Superiority of standard breed.
- G. Selection of breeders.
- H. Purpose of breeding.
- I. Time of year to make up breeding pen.
- J. Age of fowls to use for breeding.
- K. Proportion of males to females.
- L. Judging of poultry.

III. *Poultry management.*
- A. Incubation.
    - 1. Natural and artificial incubation.
    - 2. Selection and care of eggs for hatching.
    - 3. Time of year to hatch.
    - 4. Natural incubation.
        - a. How to set a hen.
        - b. Indications of broodiness.
        - c. Quarters.
        - d. Control of lice and mites.
        - e. Management of sitting hen.
    - 5. Artificial incubation.
        - a. Types of incubators.
        - b. Operation of incubators.
        - c. Place for incubator.
        - d. Correct temperature.
        - e. Turning, cooling and testing eggs.
        - f. Moisture and ventilation.
        - g. Disinfecting and storing incubators.
- B. Brooding.
    - 1. Natural brooding.
        - a. Type and care of brood coops.
        - b. Treatment of mother hen.
        - c. Number of chicks, per hen.

- 2. Artificial brooding.
  - a. Hovers and brooders.
  - b. Brooder stoves.
  - c. Hot water pipe brooders.
  - d. Fireless brooders.
  - e. Proper temperature.
  - f. Care of purchased day-old chicks.

C. Poultry houses.

- 1. Colony and continuous houses.
- 2. Location.
- 3. Plans for house.
- 4. Building of house.
- 5. Arrangement of interior.
  - a. Roosts and dropping board.
  - b. Nests.
- 6. Drinking fountains.
- 7. Ventilation.
- 8. Yards, fences and gates.
- 9. Paint and whitewash.

D. Diseases and pests.

- 1. Importance of prevention.
- 2. Sanitation.
- 3. Diagnosis of disease.
- 4. Post-mortem examination.
- 5. Treatment for different diseases.
- 6. Control of lice, mites and rats.

E. Capons.

- 1. Profits in capons.
- 2. Most suitable breeds.
- 3. Time to caponize.
- 4. The operation.
- 5. Care before and after operation.
- 6. Killing and dressing.

F. Culling the flock.

- 1. Culling the growing stock.
- 2. When to cull.
- 3. Characteristics by which to cull.
  - a. Molt.
  - b. Color and condition of shanks.
  - c. Color of beak.
  - d. Color of vent.
  - e. Comb.
  - f. Pelvic and keel bones.
  - g. Flexibility of abdomen.

G. Marketing of poultry and poultry products.

- 1. Marketing eggs.
  - a. Infertile eggs.
  - b. Gathering eggs.
  - c. Grading and packing.
  - d. Home market.
  - e. Special city market.
  - f. Commission merchants.
  - g. Storage of eggs.

- 2. Marketing table fowls.
    - a. Different methods of killing and preparation.
    - b. Broilers and capons.
    - c. Shipping.
- H. Artificial illumination.
  - 1. Experimental data on lights.
  - 2. Kinds of lights to use.
  - 3. How to operate lights.
  - 4. Methods of feeding.
  - 5. Evening lunch.
- I. Value of egg laying contests.
  - 1. Important contests.
    - a. Philadelphia North American Contest, Georgetown Del.
    - b. National Egg-Laying Contest, Mountain Grove. Mo.
    - c. Vineland International Egg-Laying and Breeding Contest. New Brunswick, N. J.

IV. *Feeds and feeding.*

- A. Grains and their by-products.
- B. Animal feeds.
- C. Legumes and grasses.
- D. Succulent feeds.
- E. Minerals and grit.
- F. Feeding chicks.
  - 1. First feed.
  - 2. Shell and grit.
  - 3. Sour milk.
  - 4. Cracked grains.
  - 5. Mash.
  - 6. Feeding practices.
  - 7. Green feed.
  - 8. Cleanliness.
  - 9. Rations.
- G. Feeding for egg production.
  - 1. Loss from feeding only corn or wheat.
  - 2. Mash feeds.
  - 3. Commercial feeds.
  - 4. Compounding rations.
  - 5. Proportion of grain to mash.
  - 6. Greens, succulence and legumes.
  - 7. Wet or dry mash.
  - 8. Grit, shell, charcoal and salt.
  - 9. Hopper feeding.
  - 10. Grain in litter.
  - 11. Protein feeds.
  - 12. Protective feeds.

V. *Suggestions for laboratory exercises and field trips.*

A. Poultry

1. Poultry census of community.
2. Indentifying fowls of various classes and breeds,
3. Selecting fowls for breeding pen,

4. Judging poultry.
5. Study and operation of incubator.
6. Grading and candling eggs.
7. Testing eggs in incubator.
8. Details of setting a hen.
9. Study and operation of a brooder.
10. Plans for poultry houses.
11. Remodeling an old poultry house.
12. Post-mortem examination of fowl that died of disease.
13. Caponizing cockerels.
14. Killing, dressing and packing poultry.
15. Culling for egg production.
16. Trip to an important egg-laying contest.
17. Mixing balanced rations.

VI. Suggested Equipment for Poultry

- A. Leg bands and punch for marking fowls.
- B. Incubators.
- C. Brooder stove and hover.
- D. Outfit for candling eggs.
- E. Caponizing instruments.
- F. Knives for killing poultry by sticking.
- G. Feed hoppers.

VII. Bibliography on Poultry

American Standard of Perfection—American Poultry Association, Mansfield, Ohio.

Curtis, G. M.—Artifical Light to Increase Winter Egg—Reliable Poultry Journal Co., Quincy, Ill.

Curtis and Jackson—Profitable Culling and Selective Flock Breeding—Reliable Poultry Journal Co., Quincy, Ill.

Hansen, S. G.—Commercial Egg Farming—E. P. Dutton and Company, N. Y.

Jackson, H. W.—Artificial Incubation and Brooding—Reliable Poultry Journal Co., Quincy, Ill.

Jackson, H. W.—The Chick Book—Reliable Poultry Journal Company, Quincy, Ill.

Lamon and Kinghorn—Practical Poultry Production—Webb Publishing Company, St. Paul, Minn.

Lewis, H. R.—Making Money from Hens—J. B. Lippincott Co., Philadelphia, Pa.

Lewis, H. R.—Productive Poultry Husbandry—J. B. Lippincott Company, Philadelphia, Pa.

Lippincott, W. A.—Poultry Production—Lea and Febiger, Philadelphia, Pa.

Purvis, Miller—Poultry Breeding—Sanders Publishing Co., Chicago, Ill.

A UNIT IN VEGETABLE GARDENING

I. Introduction

- A. Importance of vegetable gardening.
  - 1. In the United States.
  - 2. Relative importance in Pennsylvania.
  - 3. Importance to local community.
- B. Types of vegetable gardens.
  - 1. Factors that determine the type of vegetable gardening to be followed, by any given community.
  - 2. Types of vegetable gardening adapted to the local community.
- C. Adaptations.
  - 1. Climatic conditions.
  - 2. Soils adapted to vegetable gardening.

- D. Manures used in vegetable gardening.
    - 1. Stable manures.
    - 2. Green manures and cover crops.
    - 3. Commercial fertilizers.
- E. Garden seed.
    - 1. Importance of planting good seed.
    - 2. Methods of obtaining seed.
    - 3. Commercial seed growing.
- F. Hotbeds, cold frames, and green houses.
    - 1. Relation of each to vegetable gardening.
    - 2. Construction of each.
- G. The sowing of seed.
    - 1. Conditions necessary.
    - 2. Time, depth, rate of sowing.
- H. Transplanting.
    - 1. Reasons for transplanting.
    - 2. Methods of transplanting.
- I. Cultivation of vegetable gardens.
    - 1. Purpose of each cultivation.
    - 2. Machinery used.
- J. Irrigation.
    - 1. Necessity for irrigation.
    - 2. Methods adapted to local conditions.
- K. Insect enemies and diseases.
    - 1. General control of vegetable insects.
    - 2. General treatment for vegetable diseases.
- L. Marketing of vegetables.
    - 1. Locally.
    - 2. Commercially through cooperative associations, etc.
- M. The storage of vegetables.
    - 1. Necessity of storing.
    - 2. Methods adapted to local conditions.

II. Classification of vegetables.

- A. Basis of classification.
- B. Distinguishing characteristics of each class.
- C. Names of classes and vegetables belonging to each class.

III. Outline for study of all vegetables adapted to Pennsylvania conditions.

- A. Description of the different plants.
    - 1. Origin and history.
    - 2. Climatic and soil adaptations.
    - 3. Importance of vegetable to local community.
- B. Varieties of each vegetable grown locally.
    - 1. Distinguishing characteristics.
    - 2. Local adaptations.
- C. Special culture required of vegetables grown locally.
    - 1. Time, rate, and method of seeding.
    - 2. Purpose of each cultivation.
- D. Insects and diseases of vegetable.
    - 1. Kinds of insects and diseases affecting locally.
    - 2. Control of insects and treatment for diseases.

- E. Harvesting and marketing.
  - 1. Precautions to be observed in harvesting.
  - 2. Necessity for grading.
  - 3. Methods of marketing.
- F. Uses.
  - 1. As a raw product.
  - 2. As a canned product.

IV. *Plans for the different types of vegetables.*

- A. Crop rotations.
- B. Succession and companion cropping.
- C. Planting tables.
- D. Plans for at least one type of garden.

V. *Practical work in vegetable gardening.*

- A. Laboratory, demonstrations, and field trips.
  - 1. Construction of hot beds and cold frames.
  - 2. Preparing and seeding hot beds.
  - 3. Propagation by cutting.
  - 4. Testing garden seed.
  - 5. Study of insects destructive to vegetables.
  - 6. Study of diseases of vegetables.
  - 7. Preparing insecticides and fungicides.
  - 8. Spraying for insects and diseases.
  - 9. Study of all vegetables adapted to the local community.
  - 10. Planning a typical home garden.
- B. Project work in vegetable gardening.

(See Watts—Vegetable Growing Projects—Macmillan Co.)

VI *Typical farm shop work, correlating with vegetable gardening.*

- A. Cabinet for garden seed.
- B. Cold frame.
- C. Dibbers.
- D. Flats.
- E. Garden marker.
- F. Hot bed.
- G. Repair garden tools.
- H. Stakes for different vegetables.
- I. Transplanting board.

Note—See outline of farm shop work for additional farm shop work correlating with vegetable gardening.

VII. *Suggested references on vegetable gardening.*

- A. Books.
  - 1. *Boyle*—Vegetable Growing—Lea Febiger—Philadelphia.
  - 2. *Bailey*—Manual of Gardening—Macmillan, N. Y.
  - 3. *Bailey*—Principles of Vegetable Gardening—MacMillan, N. Y.
  - 4. *Bailey*—Cyclopedia of American Horticulture—Webb Pub. Co., St. Paul, Minn.
  - 5. *Green*—Vegetable Gardening—Webb Pub. Co., St. Paul, Minn.
  - 6. *Lloyd*—Productive Vegetable Gardening—Lippincott, Philadelphia.
  - 7. *Miall*—Injurious and Useful Insects—MacMillan.
  - 8. *Watts*—The Vegetable Garden—Outing Pub. Co., N. Y.
  - 9. *Watts*—Vegetable Gardening—Orange Judd, N. Y.
  - 10. *Watts*—Vegetable Growing Projects—MacMillan.

B. Bulletins.

Prior to the opening of school, lists of bulletins on vegetable gardening should be secured. From these lists, a limited number of bulletins should be selected. The following are sources of bulletins on vegetable gardening:

1. Supt. of Documents—U. S. Dept. of Agriculture, Washington D. C.
2. Mailing Clerk—Pa. State College, State College, Pa.
    a. Experiment Station Bulletins.
    b. Extension Circulars.

VIII. Suggested list of vegetable gardening equipment, other than that suggested under farm crops.

A. Cold frame.
B. Collection of vegetable seeds.
C. Flats.
D. Hand cultivator.
E. Hoes.
F. Hot bed.
G. Paper pots.
H. Rakes.
I. Sprayer.
J. Trowels.
K. Wheel cultivator.

A UNIT IN ORNAMENTAL GARDENING

A limited number of lessons will probably be sufficient to give pupils such information as they need to have relative to ornamental gardening. The course in ornamental gardening should be organized on such a basis as will give the pupils ample time for actual practical work, and field trips. The course may be given to the best advantage in the early spring. The work in ornamental gardening should include:

I. Necessity for ornamental gardening.

A. Pictures showing grounds before and after planting.
B. Study the effects of planting home grounds.

II. Factors affecting home beautification.

A. Climatic and soil conditions.
B. Availability of plants.
C. The home buildings.
    1. Location of each.
        a. With relation to each other.
        b. With relation to the grounds.
    2. Adaptation of type to environment.
D. Principles and aims.

III. The lawn.

A. Different methods of securing.
B. Care of.

IV. Walks and drives.

A. Location.
B. Construction.

V. Types of plants and varieties adapted to local conditions.

A. Grasses.
B. Evergreens.
C. Deciduous trees and shrubs.

D. Trailers and climbers.
E. Herbaceous plants.
F. Annuals.
G. Miscellaneous plants.

VI. *Arrangement of plants.*

A. Adaptation of architectural designs to local conditions.
B. The open lawn.
C. Grouping of trees and shrubs.
D. The use of hedges.
E. Screens.
F. Borders.
G. Climbers.
H. Ornamental plants.

Note: Illustrated lectures showing the effect of different arrangements of plants should be given.

VII. *Drawing of plans for beautification of home and school grounds.*

A. Each pupil should draw a detailed plan for the beautification of his respective home, such a plan to include:
    1. A sketch showing location of each building.
    2. A sketch showing the proposed location of the different plants.
B. Each pupil should draw a sketch of the school building, indicating the different plants to be planted and the proposed location of each.

VIII. *Actual practice in ornamental gardening.*

A. After the plans have been revised by the teacher each pupil should be urged to carry out, as an improvement project, his respective plan for home beautification.
B. The plans for the improvement of the school grounds should be discussed by the members of the class after which a final plan should be drawn either by the teacher or by a member of the class. This plan should then be executed as a group project.

IX. *Practicums in the beautification of the school grounds should include:*
A. Cleaning up the school grounds.
B. Preparing soil for planting.
C. The planting of seeds.
D. The setting out of plants.
E. The pruning of plants.
F. The care of the lawn.
G. The care of plants.
    1. Cultivation.
    2. Control of insects and diseases.
    3. Tree surgery.
H. The disposal of flowers.
I. The construction of walks and drives.

X. *Field trips in ornamental gardening* should include trips made for the purpose of studying:
A. The effects of different types of plantings.
B. The production of green-house plants.
C. Different types of home buildings.
D. The preparation of a lawn for planting seed.

- E. The effects and construction of different types of walks and drives.
- F. Types and varieties of plants adapted to local conditions.
- G. Arrangement of plants.

XI. References.

- A. Books—
  - 1. *Maynard*—"Landscape Gardening"—John Wiley & Sons, New York.
  - 2. *Waugh*—"Landscape Gardening"—Orange Judd Co., New York.
- B. Bulletins—
  - 1. U. S. Department of Agriculture, Washington, D. C.
  - 2. Penna. State College, State College, Pa.

A UNIT IN FARM CROPS

I. Principles of plant production:

- A. The seed as the most important method of propagating farm crops.
  - 1. Detailed study of parts.
  - 2. Germination.
    - a. The plantlet.
      - (1) Parts and function of each.
      - (2) Factors affecting development.
    - b. The hot bed and its relation to farm crops.
      - (1) Construction.
      - (2) Filling and care.
- B. The relation of the soil to farm crops.
  - 1. Origin of soil.
    - a. Agencies affecting soil formation.
    - b. Geological classification.
  - 2. Physical properties of soil.
    - a. Texture vs structure.
    - b. Factors affecting.
  - 3. Mechanical analysis of soils.
    - a. Classes and characteristics of each.
    - b. Factors affecting.
  - 4. Chemical analysis of soils.
    - a. Composition of soil.
    - b. Relative importance of soil elements.
  - 5. Maintaining soil fertility.
    - a. Systems of farming.
    - b. Addition of natural fertilizers.
    - c. Addition of commercial fertilizers.
  - 6. Tillage.
    - a. Purposes and principles involved.
    - b. Methods and machinery used.

II. Farm crops:

- A. Classification.
  - 1. Cereal.
  - 2. Tuber.
  - 3. Root.
  - 4. Legume.
  - 5. Grass.
  - 6. Fiber.
- B. Basis of classification.
  - 1. Characteristics of each.
  - 2. Typical examples of each class.

III. Cereals

A. Corn.

1. History and importance of corn.
    a. Nativity and relationships.
    b. Importance as a crop in the United States.
    c. Importance as a Pennsylvania crop.
    d. Importance of corn as a local crop.
2. Description of the plant.
    a. Distinguishing characteristics.
    b. Function of parts of plant.
3. Types of corn.
    a. Characteristics of each type.
    b. Distribution of each type.
    c. Adaptation to local conditions.
4. Varieties of corn.
    a. Characteristics of each variety.
    b. Adaptation of each variety to local conditions.
5. Improvement of corn.
    a. Through selection.
    b. Through breeding.
6. Fertilizers and manures for corn.
    a. Comparative value.
    b. Availability.
7. Care and testing of seed corn.
    a. Method used.
    b. Factors affecting germination of seed corn.
8. Preparation of seed bed and planting corn.
    a. Time and method.
    b. Machinery used.
9. Cultivation of corn.
    a. Purpose and method of each cultivation.
    b. Time of each cultivation.
10. Enemies and diseases of corn.
    a. Kinds of enemies and diseases affecting corn.
    b. Control of enemies and treatment for diseases.
11. Harvesting and field selection of corn.
    a. Conditions governing harvesting.
    b. Advantages of field selection of seed corn.
12. Storing and marketing of corn.
    a. Method of storing.
    b. Conditions governing the marketing of corn.
13. Uses of corn and corn products.
    a. Animal consumption.
    b. Human consumption.
14. Scoring and judging of single and ten ear samples of corn. Practice in scoring and judging of samples of corn sufficient to enable a pupil to become efficient in scoring and judging should be given at intervals during the study of corn. Such field trips and actual work as is necessary to acquaint the pupil with actual practices of the community should be included in the course.

B. Wheat.

1. Importance of the wheat crop.
    a. The importance of the wheat crop in the United States as compared with other countries.
    b. The value of the wheat crop in Pennsylvania as compared with other leading farm crops.
    c. Wheat as a local farm crop.
2. Origin and description of the wheat plant.
    a. Stages in development of the wheat plant.
    b. Description of the wheat plant.
3. Wheat types.
    a. Characteristics of each type.
    b. Distribution of each type.
4. Classification.
    a. Basis of classification.
    b. Distribution of the different classes.
5. Wheat varieties.
    a. The origin of varieties.
    b. Leading varieties in Pennsylvania.
    c. Adaptation of leading Pennsylvania varieties to local conditions.
    d. Improving varieties.
6. Wheat culture.
    a. Types of soil adapted to wheat growing.
    b. Preparation of seed bed for wheat.
    c. The seeding of wheat.
7. Diseases and insect enemies of wheat.
    a. Kinds of enemies and diseases affecting wheat in Pennsylvania.
    b. Control of enemies and treatment for diseases.
8. The harvesting and threshing of wheat.
    a. Conditions governing.
    b. Methods used.
9. The storing, marketing and milling of wheat.
    a. Conditions governing.
    b. Local marketing vs shipping.
    c. Milling.
10. Uses of wheat.
    a. Human consumption.
    b. Animal consumption.
11. Scoring and judging of wheat.

    Practice in scoring and judging of samples of wheat sufficient to enable a pupil to become efficient in scoring and judging should be given. Such field trips and actual work as is necessary to asquaint the pupils with local practices should be included in the course.

C. Oats.

1. Importance of the oat crop.
    a. In the United States.
    b. Comparative value of the oat crop in Pennsylvania.
    c. Oats as a local farm crop.
2. Description of the oat plant.
    a. Early history of the plant.
    b. Characteristics of the plant at present.

3. Classification of oats.
    a. Basis of classification.
    b. Characteristics of each class.
4. Varieties of oats.
    a. Leading varieties in Pennsylvania.
    b. Varieties especially adapted to local conditions.
    c. Improvement of oats.
5. Culture of oats.
    a. Climatic requirements.
    b. Soils adapted to the growing of oats.
    c. Preparation of the seed bed.
    d. The seeding of oats.
6. Diseases and insects of oats.
    a. Kinds of insects and diseases affecting oats in Pennsylvania
    b. Control of enemies and treatment for diseases.
7. The harvesting and threshing of oats.
    a. Methods used.
    b. Conditions governing.
8. The storing and marketing of oats.
    a. Local marketing vs shipping.
    b. Conditions affecting marketing.
9. Uses of oats.
    a. For animal consumption.
    b. For human consumption.
10. Scoring and judging of oats. Such practice in scoring and judging of oats as is necessary for the development of competent work in judging by pupils should be given; as should also field trips and actual practice in growing oats.

D. Tobacco. (Stimulant)

1. Tobacco as a farm crop.
    a. The value of tobacco grown in the United States as compared with that grown in other countries.
    b. The value of tobacco in Pennsylvania as compared with other leading crops.
    c. The value of the local tobacco crop.
2. Origin and description of the tobacco plant.
    a. Origin of the plant.
    b. Distinguishing characteristics of the plant.
3. Adaptation of tobacco.
    a. Climatic conditions.
    b. Soil conditions.
4. Tobacco culture.
    a. Preparation of the seed bed and sowing the seed.
    b. The transplanting of tobacco.
    c. Care of the growing crop.
    d. Purpose of method of cultivating.
5. Insects and diseases of tobacco.
    a. Kinds affecting tobacco crops in Pennsylvania.
    b. Control of insects and treatment for diseases.
6. Harvesting and storing.
    a. Different methods of curing.
    b. Precautions to be observed in storing.

7. Uses of tobacco.
    - a. For human consumption.
    - b. As an insect repellant.

E. Buckwheat.

1. Production.
    - a. In the United States.
    - b. Comparative value as a Pennsylvania crop.
2. Origin and history.
3. Relationships.
4. Classification of buckwheat.
5. Adaptations.
    - a. Climatic conditions.
    - b. Soil conditions.
6. Seeding.
    - a. Preparation of seed bed.
    - b. Time and method of seeding.
7. Harvesting, marketing and milling.
    - a. Conditions affecting harvesting.
    - b. Markets—and milling.
8. Uses of buckwheat.
    - a. For human consumption.
    - b. As a green manuring crop.
9. Such field trips and actual work as is essential to a knowledge of the culture of buckwheat should be included.

F. Rye.

1. Importance as a Pennsylvania farm crop.
    - a. In the State as a whole.
    - b. As a local crop.
2. Description of the rye plant.
    - a. Relationships.
    - b. Characteristics of the plant.
3. Adaptations of the rye plant.
    - a. Climatic adaptations.
    - b. Soil conditions.
4. Cultural methods.
    - a. Preparation of seed bed.
    - b. Time, rate and method of seeding.
    - c. Rye as a pasture crop.
5. Harvesting and marketing.
    - a. Methods of harvesting.
    - b. Conditions governing marketing.
6. Uses of rye.
    - a. For animal consumption.
    - b. For human consumption.

G. Barley

1. Barley as a Pennsylvania farm crop.
    - a. Barley production throughout the State.
    - b. Importance of barley as a local crop.
2. Origin and description of barley.
    - a. Relationship.
    - b. Characteristics of the plant.

3. Classification and types.
    a. Basis of classification.
    b. Characteristics of types.
4. Varieties of barley.
    a. Those especially adapted to Pennsylvania conditions.
    b. Varieties adapted to local conditions.
5. Culture of barley.
    a. Climatic and soil adaptations.
    b. Preparation of seed bed and seeding.
6 Harvesting and marketing.
    a. Conditions governing.
    b. Local markets vs shipping.
7. Uses.
    a. For human consumption.
    b. For animal consumption.

IV. *Tuber crops*

A. Irish and sweet potatoes.
1. Relative importance as Pennsylvania farm crops.
    a. Value of potato crop of Pennsylvania as compared with other states.
    b. Leading potato sections of Pennsylvania.
    c. The importance of the local potato crop as compared with other leading crops.
2. Description of the potato plant.
    a. Relationships of the plant.
    b. The structure and composition of the tuber.
3. Classification.
    a. Basis for classification.
    b. Characteristics of the different classes.
    c. Climatic and soil adaptations.
4. Varieties of the Irish and sweet potatoes.
    a. Varieties adapted to Pennsylvania conditions.
    b. Varieties best adapted to local conditions.
5. Cultural methods.
    a. Manures and fertilizers adapted to potatoes.
    b. Securing of seed potatoes and sweet potato slips.
    c. Preparation of soil for planting Irish potatoes.
    d. Time, rate and depth of planting Irish potatoes.
    e. Purpose and method of each cultivation.
6. Insects and diseases of potatoes.
    a. Kinds and nature of insects and diseases.
    b. Control of insects and treatment for diseases.
7. Harvesting and marketing of potatoes.
    a. Hill selection of seed potatoes.
    b. Methods of harvesting.
    c. Grading potatoes for market.
    d. Selling on local markets vs shipping.
8. Storing of potatoes.
    a. Method of storing Irish potatoes.
    b. Methods of storing sweet potatoes.
9. Uses of potatoes.
    a. Irish potatoes.
    b. Sweet potatoes.

10. Such demonstrations, field trips, practice in judging, and actual work in growing potatoes as is necessary for a complete understanding of potato growing should be included.

V. *Root Crops.*

Root crops such as turnips, beets, carrots and parsnips should be studied in vegetable garden since they are not considered as field crops in Pennsylvania.

VI. *Legumes.*

A. Description of legumes.
  1. Distingishing characteristics.
  2. Classification.
  3. Relation to Pennsylvania farming.

B. The Clovers.

  1. General information.
    a. Origin and history.
    b. Relation to farming in Pennsylvania.
    c. Classification.
  2. Varieties of clover.
    a. Grown in the United States.
    b. Adapted to Pennsylvania conditions.
    c. Local adaptation.
  3. Outline for variety study.
    a. Description of plant.
    b. Seeding.
    c. Insects and diseases and their control.
    d. Harvesting and marketing.
    e. Uses.

C. Alfalfa.

  1. Description of plant.
    a. Origin and history.
    b. Climatic and soil adaptations.
    c. Life period of alfalfa.
    d. Methods of growth.
  2. Classification.
    a. Basis of classification.
    b. Distinguishing characteristics of each class.
  3. Alfalfa culture.
    a. Methods of seeding.
    b. Inoculation for alfalfa.
    c. Cultivation.
  4. Insects and diseases.
    a. Affecting alfalfa grown in Pennsylvania.
    b. Control of insects and treatment for diseases.
  5. Harvesting, curing and marketing.
    a. Precautions to be observed in harvesting and curing.
    b. Methods of marketing.
  6. Uses of alfalfa.
    a. As a hay crop.
    b. As a pasture.

- D. The cow pea, soy bean, and vetches.
  - 1. Description of plants of each.
    - a. Origin and history of each.
    - b. Climatic and soil adaptations of each.
    - c. Importance of each as a Pennsylvania crop.
  - 2. Varieties of cow peas, soy beans and vetches.
    - a. Grown in the United States.
    - b. Varieties adapted to Pennsylvania conditions.
    - c. Varieties adapted to local conditions.
  - 3. Culture of cow peas. soy beans and vetches.
    - a. Preparation of soil for seeding of each.
    - b. Time, rate and method of seeding.
  - 4. Insects and diseases.
    - a. Kinds affecting crops in Pennsylvania.
    - b. Control of insects and treatment for diseases
  - 5. Harvesting, curing, marketing.
    - a. Precautions to be observed in harvesting and curing.
    - b. Marketing.
  - 6. Uses of cow peas. soy beans and vetches.
    - a. As hay crops.
    - b. As silage crops.
    - c. As green manure crops.
  - 7. Indentification of seeds of different varieties of legumes. Such practice as is necessary to enable pupils to identify the seeds of each variety of legumes studied should be given.

VII. *Grasses*, including timothy, blue grass, red top, millet and such other grasses as may be grown locally or adapted to local conditions.

- A. Description of each.
  - 1. Classification of grasses.
  - 2. Distinguishing characteristics of each.
  - 3. Relationship of each.
- B. Adaptation.
  - 1. Soil and climatic adaptations of each grass studied.
  - 2. Importance of each grass studied to Pennsylvania conditions.
  - 3. Importance of each grass studied to local conditions.
- C. Culture of each grass studied.
  - 1. Preparation of seed bed.
  - 2. Time, rate, and method of seeding each.
  - 3. Care of the meadow.
- D. Insects and diseases of each.
  - 1. Control of insects.
  - 2. Treatment for diseases.
- E. Harvesting, curing and marketing.
  - 1. Precautions to be observed in the harvesting and curing of each of the grasses used for hay.
  - 2. The marketing of the hay crops.
- F. Identification of grass seed. Such pratice as is necessary to enable pupils to identify the seed from grasses adapted to Pennsylvania should be given.

VIII. Fiber crops, cotton, flax, and hemp.

- A. Description of each plant.
  - 1. Characteristics.
  - 2. Relationships.

B. Classification of each crop.
    1. Basis of classification.
    2. Characteristics of each.
C. Varieties of each crop.
    1. Origin of varieties.
D. Culture of each crop.
    1. Preparation of seed bed.
    2. Time, rate and method of seeding.
    3. Purpose and time of each cultivation.
E. Insects and diseases of each fiber crop.
    1. Control of insects.
    2. Treatment for diseases.
F. Harvesting and marketing of each crop.
    1. Precautions to be observed.
    2. Methods.
G. Uses of each fiber crop.

IX. *Suggested List of Laboratory Exercises, Demonstrations and Field Trips*

A. *Farm Crops.*
1. Collection of seed.
2. Study of seed.
3. Study of root system.
4. Demonstration of osmosis.
5. Study of stem structure.
6. Study of the flower parts.
7. Excessive and insufficient amounts of water for plants.
8. The effect of sunlight on foliage.
9. Effect of different fertilizers on plant growth.
10. Study of common weeds.
11. Collecting soil samples.
12. Mechanical analysis of soil.
13. Moisture content of soil.
14. Study of soil texture.
15. Effect of lime on soil—Test for soil acidity.
16. Physical study of commercial fertilizers.
17. Study of fertilizers tags.
18. Study of capillary moisture in soil.
19. Detemination of the weight of the soil.
20. Study of mulches.
21. Study of temperature of soils.
22. Testing for acidity and alkalinity of soil.
23. Study of soil formation, field trip.
24. Maps showing the soils of Pennsylvania.
25. Study of enlarged roots of plants.
26. A study of the corn plant.
27. A study of the types of corn.
28. Corn variety study.
29. Germinating seed corn.
30. Judging single ears of corn.
31. Placing single ears of corn.
32. Judging ten-ear samples.
33. A study of the wheat plant.
34. Treatment of grain for smut.
35. Study of tubercles on legume plants.

36. A study of the oat plant.
37. Scoring and placing oat samples.
38. A study of potato varieties.
39. Study of cross sections of Irish potatoes.
40. Study diseases of Irish potatoes.
41. Storing potatoes.
42. Study of cowpeas and soy bean varieties.
43. A study of quack grass.
44. A study of noxious weeds.
45. Identification of farm seeds.
46. Study methods of inoculating alfalfa seed.
47. Study methods of selecting seed potatoes.

X. *Farm Shop Work to be Correlated with:*

A. Farm Crops
1. Bins for grain.
2. Corn crib.
3. Double and single trees.
4. Ensilage rack.
5. Land leveler.
6. Plank drag.
7. Planting stick.
8. Seed corn curing frame.
9. Wagon bed for grain.
10. Repairing farm crops machinery.

Such other farm shop work as is related to the growing of farm crops in the local community should be made.

XI. *Suggested Books Referances in Farm Crops.*

A. Books.

Andrews—Practical Courses in Botany—American Book Co., N. Y.
Davis—Productive Plant Production—Lippincott Co., Philadelphia.
Goff—Principles of Plant Culture—MacMillan Co., N. Y.
Hunt—Cereals in America—Orange Judd, N. Y.
Livingston—Field Crop Production—MacMillan Co., N. Y.
Montgomery—Productive Farm Crops—Lippincott, Philadelphia.
Storm & Davis—How to Teach Agriculture—Lippincott, Philadelphia.
Vorhess—Forage Crops—MacMillan Co., N. Y.
Wilson & Warburton—Farm Crops—Webb Publishing Co., St. Paul Minn.

B. Bulletins

Source of Free Bulletins on Farm Crops.

U. S. Department of Agriculture, Washington, D. C.
1. Farmer's Bulletins.
2. Bureau of Plant Industry Bulletins.
3. Bureau of Soils Bulletins.

Mailing Clerk, Pennsylvania State College, State College, Pa.
1. Experiment Station Bulletins.
2. Extension Circulars.

XI *Suggested list of equipment for farm crops.*

Alcohol lamps, (8) (if gas is not available.)
Balopticon.
Camera or kodak.
Capillarity tubes, 2 x 8 inch (6).
Crucible tongs, 9 inch (1 pair).

Evaporating dishes. No. 000 (6).
Funnel and funnel support.
Filter paper 12.5 cm. (1 package).
Graduate cylinder, 100 cc.
Mortar and pestle, 100 mm.
Mount of common farm seeds.
Nest of beakers Nos. 0000-00.
Nest of beakers Nos. 0-3.
Retort stand with three rings.
Riker specimen mounts, 5 x 6 inch (6).
Rulers (6).
Score cards, corn (4 tablets).
Score cards, oats (4 tablets),
Score cards, wheat (4 tablets).
Soil auger.
Soil thermometer.
Soil sieves (one set).
Support for capillarity tubes.
Tape measure, 50 feet.
Test tubes, 3 x ⅜ inch (12).
Test tubes, 5 x ⅝ inch (12).
Test tube rack.
Thermometer, 10 to 110 cc. (12 inch).
Tripod magnifiers (4).
Trip scale.
Tube brush.
Weights, 5 to 1000 g. iron.
Wire gauze, 12 x 12 inch.

A UNIT IN BEEF CATTLE

1. *Principal beef breeds.*
   A. Shorthorn.
   B. Polled Durham.
   C. Hereford.
   D. Aberdeen Angus.

II. Feeding.
   A. Corn and its relative value in fattening cattle.
   B. Preparation of feed.
   C. Nitrogenous supplements.
   D. Choice of roughages.
   E. Corn silage.
   F. Amounts of feed per animal.
   G. Getting cattle on feed.
   H. Methods of feeding salt.
   I. Wintering feeders.
   J. Fattening while on pasture.

III. Management.
   A. Judging beef cattle.
   B. Long or short feed.
   C. Production of baby beef.
   D. Dehorning stockers and feeders.
   E. Grade of feeders to buy.

- F. When and where to buy.
- G. Profits determined by.
  - 1. Purchase price.
  - 2. Cost of feed.
  - 3. Cost of labor.
  - 4. Selling price.
  - 5. Value of manure.
- H. General care of cattle on feed.
  - 1. Importance of quietness.
  - 2. Feed two or three times a day.
  - 3. Salting and watering.
- I. Feeding for local market or for shipment.
- J. Preparing steers for shipment.
- K. Fattening on pasture.
- L. Hogs in feed lot.
- M. Breeding beef cattle.
- N. Dual purpose cow for beef production.

A UNIT IN HORSES.

I. Horses and farm motors.
- A. Number of horses 1910-1920.
- B. Comparative economy of the two sources of power.
- C. Causes of rapid increase of farm motors.
- D. Future of horse industry.

II. Breeds.
- A. Draft horses.
  - 1. Percheron.
  - 2. Belgian.
  - 3. Clydesdale.
  - 4. Shire.
- B. Carriage horses.
- C. Saddle horses.
- D. Judging horses.
- E. Mule breeding.

III. Care and management of stallion.
- A. An individual of quality.
- B. Desirable size and weight.
- C. Buying a stallion.
- D. Conditions of contract for service.
- E. Danger of feeding too much hay.
- F. Necessity of daily exercise.
- G. Actual work in harness best form of exercise.
- H. Minimum and maximum age for service.

IV. Mares and foals.
- A. Feed and work for mares in foal.
- B. Necessity of some exercise.
- C. Fall or spring foals.
- D. Danger of injury to mares in a herd.
- E. Shelter.
- F. Harm from exclusive corn ration.
- G. Addition of roots and silage to ration.
- H. Precautions at foaling time.

- I. When to wean foal.
- J. Feeding foal before and after weaning.
- K. Raising an orphan foal.
- L. Protection of foal against extremes of temperature and weather.
- M. Castrating colts.
- N. Breeding two-year old fillies.
- O. Rate of growth of foal.

V. *Breaking and training colts.*
- A. Requirements of a good horseman.
  - 1. Kindness.
  - 2. Horse sense.
  - 3. Light touch.
  - 4. Determination.
  - 5. Control of himself.
  - 6. Resourcefulness.
- B. Age to begin training.
- C. Difference in horses.
- D. Leading, harnessing, driving and riding.
- E. Obedience to commands.
- F. Breaking of bad habits.

VI. *Feeding and management.*
- A. Danger in sudden changes of feed.
- B. Oats and corn.
- C. Substitutes and supplementary feeds.
- D. Roughages and succulent feeds.
- E. Feeding the working horse and the idle horse.
- F. Fattening horses.
- G. Time of day to feed.
- H. Economic wintering of horses.
- I. Horse shoeing and preservation of hoof.
- J. Causes of and remedies for lameness.
- K. Care of horse's teeth.
- L. Fitting of collar and harness.
- M. Buying and selling horses.
- N. Advisability of clipping horses.
- O. Grooming and bedding.
- P. Stabling of horses.
  - 1. Box stall.
  - 2 Stall partitions.
  - 3. Bales.
  - 4. Stall floors.
  - 5. Mangers.
  - 6. Sanitation.
  - 7. Light and ventilation.
- Q. Salt and watering.
- R. Importance of good veterinarian.

A UNIT IN SHEEP.

I. *Breeding of sheep.*
- A. Mutton breeds.
- B. Wool breeds.
- C. Judging sheep

- D. Selection and use of ram.
- E. The ewe flock.
- F. Value of sheep on the farm.
- G. Sheep breeding sections of United States and Pennsylvania.

II. General management of the flock.

- A. Handling sheep.
  - 1. Catching sheep.
  - 2. Leading sheep.
  - 3. Carrying sheep.
  - 4. Drenching sheep.
- B. Winter quarters.
- C. Lambing pens.
- D. Importance of exercise for ewes.
- E. Lambing time.
- .F Rearing lambs.
- G. Shearing and dipping the 'flock.
- H. Prevention and treatment of parasites.
- I. Fitting sheep for shows.
- J. Methods of castrating and docking.
- K. Culling the ewe flock.
- L. Winter lambs.

III. Feeding of sheep.

- A. Winter grain for ewe flock.
- B. Amount of grain to feed.
- C. Roots silage and other succulent feeds.
- D. Choice of roughages.
- E. Lamb creep and grain mixtures for lambs.
- F. Water and necessity of salt.
- G. Fattening sheep for market.

A UNIT IN SWINE

I. Scope and economic value.

- A. Sections of pork production.
- B. Six states leading in production of pork.
- C. Why these states lead.
- D. Value of swine compared with other farm animals.
- E. Importance in Pennsylvania and in your community.

II. Breeding of swine.

- A. Lard and bacon types.
- B. Principal breeds.
  - 1. Berkshire.
  - 2. Chester White
  - 3. Duroc-Jersey.
  - 4. Poland China.
  - 5. Hampshire.
  - 6. Large Yorkshire.
  - 7. Tamworth.
- C. Marking and registration.
- D. Advantages of pure-bred hogs.
- E. Grade herd.
- F. Size and age of breeding.
- G. Prolific strain.

- H. Importance of individual merit and known ancestry.
- I. Methods of breeding.
    - 1. Pure-bred swine.
    - 2. Line breeding.
    - 3. Inbreeding.
    - 4. Cross breeding.
- J. Selection of boar.
- K. Selection of sow.

III. Feeding.

- A. Nutritive ratio.
- B. Maintenance ration.
- C. Feeding for growth only.
- D. Finishing for market.
- E. Water supply.
- F. Preparation of feed.
    - 1. Grinding.
    - 2. Soaking.
    - 3. Cooking.
    - 4. Wet or dry.
- G. Winter feeding.
- H. Summer feeding.
- I. Feeding litters.
- J. Value of pasture.
- K. Roots and tubers.
- L. Mineral mixture.
- M. Self-feeder for swine.
- N. Condimental stock foods.
- O. Feeds for swine.
- P. Comparative economy of different breeds.
- Q. Feeds for lard and bacon.
- R. Hogging down corn.

IV. Management.

- A. Exercise and shelter.
- B. Farrowing time.
- C. Castrating and spaying.
- D. Age to wean.
- E. One or two litters a year.
- F. Buildings for swine.
- G. Portable pens.
- H. Sanitation.
- I. Preventible diseases.
- J. Mud wallow.

V. Marketing.

- A. Classes of market hogs.
- B. Preference of market.
- C. Study of high and low prices.
- D. Shipping hogs.
- E. Commission firms.
- F. Packing houses.
- G. When to sell.

A UNIT IN DAIRYING

I. *Introduction.*

  A. Economic importance of dairying.
  B. Value of milk as a food.
  C. States leading in dairying.
  D. Relation to soil fertility and permanent agriculture.
  E. Importance in Pennsylvania.
  F. Which counties in State lead and why?
  G. Means of regular employment of labor.
  H. Profits to be expected.

II. *Divisions of dairying and products.*

  A. Producing and selling whole milk.
  B. Marketing only cream.
  C. Butter making.
  D. Certified milk and cream.
  E. Pure-bred dairy cattle.
  F. Raising dairy calves.
  G. Marketing skim milk through hogs and poultry.
  H. Manufacturing cheese.
  I. Making ice cream.

III. *Dairy herd.*

  A. High producing cows.
  B. Losses due to "boarder cows".
  C. Testing cows.
  D. Importance of herd sire.
  E. Fall or spring calves.
  F. Judging dairy cattle.
  G. Drying off the cow.
  H. Care of cow before and after calving
  I. Study the needs of each cow.
  J. Heavy producers and milk fever.
  K. Time to turn on pasture.
  L. Supplementing pasture.
  M. Methods of milking.
    1. Hand milking.
    2. Milking machine.

IV. *Principal breeds of dairy cattle.*

  A. Holstein-Friesian.
  B. Guernsey.
  C. Jersey.
  D. Ayrshire.

V. *Silos and silage.*

  A. Advantages of silage.
  B. Silage and soiling crops compared.
  C. Silage crops.
  D. Time to cut corn for silage.
  E. Filling silo.
  F. Cost of silage.
  G. Feeding value of silage.

- H. Importance of silage in dairying.
- I. Supplementing short pastures with silage.
- J. Different kinds of silos.
  - 1. Stave.
  - 2. Concrete.
  - 3. Tile.
  - 4. Stone and brick.
- K. Essentials of a satisfactory silo.

VI. *Raising dairy cattle.*

- A. Rearing calves on whole and skim milk. Starting the calf on whole milk.
- B. Supplements to skim milk.
  - 1. Purchased.
  - 2. Home grown.
- C. Grinding grain for calves.
- D. Grain mixtures, with skim milk.
- E. Necessity of mineral matter.
- F. Water and salt.
- G. Preventing the growth of horns.
- H. Hay and succulent feeds.
- I. Using skim-milk substitutes.
- J. Feeding the heifer.
- K. Age to breed heifer.
- L. Raising and care of young bull.

VII. *Feeding.*

- A. Relation of feed to high production.
- B. Summer feeding.
  - 1. Pasture.
  - 2. Pasture and grain.
  - 3. Soiling crops.
  - 4. Summer silo.
- C. Winter feeding.
  - 1. Silage.
  - 2. Roots.
  - 3. Concentrates.
  - 4. Dry roughages.
- D. Balanced ration.
- E. Bulk and palatability.
- F. Study of different feeding stuffs.
- G. Using several concentrates in grain mixture.
- H. Balancing rations.
- I. Amount of grain and roughage to feed.
- J. Salt and water for cows.

SUGGESTIONS FOR LABORATORY EXERCISES AND FIELD TRIPS.

A. Beef cattle

1. Comparative judging of stockers and feeders.
2. Judging beef cattle used for breeding purposes.
3. Trip to stockyards with a buyer to buy feeders.
4. From a butcher obtain the retail prices of the various cuts of beef. Compare this with the price the feeder receives for fat cattle and explain the difference.

B. Horses

1. Judging farm horses.
2. Estimating the selling value of a stable of horses.
3. Determining the age of a horse.
4. Harnessing, hitching and driving horses.
5. Training a colt.

C. Swine

1. Visit a farm on which swine are a profitable specialty.
2. Judging swine.
3. Castrating pigs.
4. Mixing balanced rations.
5. Butchering demonstration.
6. Trip to a packing house.

D. Sheep

1. Dipping sheep.
2. Shearing sheep and equipment.
3. Docking and castrating sheep.
4. Judging sheep.
5. Culling a flock of ewes.

E. Dairying

1. Testing milk for butter fat.
2. Making several kinds of cheese.
3. Buttermaking.
4. Compounding a balanced and economic ration.
5. Visit a modern dairy farm and have the owner tell the class how he operates his dairy and conducts his business.
6. Determining the age of dairy cattle.
7. Judging dairy cattle.

Dairying (Con.)

8. Separating milk.
9. Learning to milk a cow.
10. Operation of a milking machine.
11. Helping to fill a silo.
12. Plans for a dairy barn and silo.
13. Estimating the value of dairy animals.

SUGGESTED EQUIPMENT FOR ANIMAL HUSBANDRY INCLUDING DAIRYING.

Score cards.
Photographs of typical individuals of breeds.
Collection of samples of home-grown and purchased feeds.
Market reports.
Collection of bits, buckles, curry combs and brushes.
(These may be borrowed from harness shop.)
Collection of horse shoes, screw calks and drive calks.
Equipment for marking animals.
Rings and pliers for ringing hogs.
Sheep shears and clippers.
Samples of milk products, such as semi-solid buttermilk, etc.
Complete milk testing outfit including centrifuge, scales, bottles for testing whole milk, cream and skim milk, pipette, acid, etc.

Butter churn.
Milk separators.
Cannula and trocar.
Bull ring and staff.

BIBLIOGRAPHY ON ANIMAL HUSBANDRY INCLUDING DAIRYING.

A. U. S. Department of Agriculture, Washington, D. C.

Farmers' Bulletins.
Department Bulletins.
Bureau of Animal Industry Bulletins.
Year Book Separates.

Note—For a complete catalogue of publications distributed by the U. S. Department of Agriculture write for bulletin entitled "Publications available for distribution."

B. Books.

GENERAL.

Curtis, R. S.—"Live Stock Judging and Selection"—Lea and Febiger, Philadelphia, Pa.

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A UNIT IN FARM FORESTRY.

I. *The tree*
  A. The parts of the tree and function of each.
  B. life processes.
  C. Natural factors influencing the life of trees.

II. *Pennsylvania's native forests.*
  A. Trees adapted to Pennsylvania conditions.
  B. Identification of all trees of the local community.
  C. Distinguishing characteristics of each variety.
    1. Soil adaptations.
    2. Habits of growth.
    3. Quality of wood and use of each variety.
    4. Rate of growth of each variety.
  D. Necessity for conservation and preservation.
  E. Reforestation.

III. *The woodlot*
  A. Value to the farmer.
  B. Adaptation to local community.
  C. Parts of the woodlot.
  D. The kinds and forms of woodlots.
  E. Establishing a woodlot.
    1. Methods used.
    2. Trees to use in starting local woodlots.
  F. Care of the woodlot.
  G. Protection of the woodlot against:—
    1. Fire.
    2. Disease.

   3. Insects.
   4. Storms.
   5. Grazing.
- H. The use of the woodlot.
   1. Systematic cutting.
   2. Use of tops and dead wood.
   3. Market value of trees.
   4. Market value of smaller timber.
- I. Harvesting the products of the woodlot.
   1. Factors affecting.
   2. Precautions to be observed.
   3. Methods and cost.
- J. Marketing the timber and the products of the woodlot.
   1. Estimating values.
   2. Estimating contents.
   3. Methods of marketing.

IV. The use of wood.

- A. Properties of wood.
- B. Treatment of perishable wood before using.

V. Project work in farm forestry.

In general, the course of study in forestry should be built up about the projects of possible interest to the pupils of a given community. Because of the run-down condition of the average woodland, the project of greatest interest to the boy may be along the line of reorganization on a profitable basis. Projects, both major and minor, of possible interest in certain communities are:—

A. Major projects.

A major project in forestry consists of a definite woodland problem involving a number of operations extending over a period of one or several years and offering opportunity for increased wood production. The following are typical major projects:

1. Reorganization of the farm woodland on a profitable basis.
2. Management of the farm woodland in the production of wood.
3. Basket willow production.
4. The production of nursery stock.
5. The management of sugar bush.

B. Minor projects.

A minor project is a farm job involving woodland products connected with a major project in field crops, animal production, forestry, orcharding or farm management. No considerable length of time is required in its execution, nor is there any question of seasonal sequence or cash returns. Often, indeed, the minor project is termed an "improvement" project, since the object is the betterment of farm conditions. The following are typical minor projects.

1. The treatment of fence posts.
2. The treatment of shingles and construction timbers.
3. Woodland planting in the reclamation of eroded fields.
4. Tree planting for the holding of stream banks.
5. Clearing land of stumps.
6. Establishment of a shelterbelt.
7. The planting of roadside trees.
8. The pruning and care of shade trees.

9. The control of tree pests.
10. Trial planting of introduced trees.
11. Estimating the volume of standing timber.
12. Manufacturing wood with the farm-saw outfit.

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B. Bulletins and circulars.
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A UNIT IN FRUIT PRODUCTION

I. *Principles of fruit production.*
  A. Importance of fruit production.
    1. In Pennsylvania.
    2. Relation to farming in the local community.
  B. Factors affecting successful fruit growing.
    1. Soil conditions.
    2. Climatic conditions.
    3. Miscellaneous.
  C. Planning the home orchard.
    1. Factors to be considered.
    2. Different fruits to be included.
    3. Plan showing location of trees.
  D. Variety study.
    1. Varieties adapted to local conditions.
    2. Determining the number of each variety.
  E. Purchasing the nursery stock.
    1. Precautions to be observed.
    2. A study of catalogues of nursery stock.
    3. Purchasing.

II. *Care of the new orchard.*

  A. Nursery stock.
    1. Care of stock before planting.
    2. Methods of planting.
  B. Cropping the orchard.
    1. Precautions to be observed.
    2. Crops adapted to orchard conditions.
  C. Culture of the orchard.
    1. Methods.
    2. Precautions to be observed.
  D. Orchard implements.
    1. Types of plows and adaptability of each.
    2. Types of harrows and adaptability of each.
    3. Types of cultivators and adaptability of each.

- E. Commercial fertilizers.
    - 1. Essentials of a good orchard fertilizer.
    - 2. Precautions to be observed in applying.
    - 3. Methods of pruning.
- F. Cover Crops.
    - 1. Purpose and effect of cover crops.
    - 2. Cover crops adapted to local conditions.
- G. Pruning the orchard.
    - 1. Principles governing pruning.
    - 2. Tools used.
    - 3. Methods of pruning.
- H. Insects affecting local orchards.
    - 1. Distinguishing characteristics of each.
    - 2. Control of each.
    - 3. Relation to pollenation.
- I. Diseases affecting local orchards.
    - 1. Characteristics of each disease.
    - 2. Control of each.
        - a. Study of different sprays.
        - b. Spraying apparatus.
        - c. Mixing of different sprays.
        - d. Precautions to be observed.
        - e. Actual practice in spraying.

III. Care of the old orchard.

- A. Renovating old orchards.
    - 1. Principles to be observed.
    - 2. Methods of renovating.
        - a. Pruning.
        - b. Grafting.
        - c. Applying fertilizers.
        - d. Cultivation.
        - e. Cover crops.
        - f. Spraying.
- B. Need for renovating locally.
- C. Actual practice in renovating.

IV. Picking and handling fruit.

- A. Thinning.
    - 1. Necessity for.
    - 2. Methods used.
- B. Harvesting.
    - 1. Picking equipment.
    - 2. Methods of picking different local fruits.
- C. The storing of fruit.
    - 1. Principles governing storage.
    - 2. Advantages and disadvantages.
    - 3. Different methods adapted to local conditions.
- D. Grading and packing of fruit.
    - 1. Reasons for grading.
    - 2. Different grades of local fruit.
    - 3. Methods of grading.
    - 4. Packing fruit.
        - a. Methods used.
        - b. Precautions to be observed.

- E. Marketing fruit.
  - 1. Factors to be considered.
  - 2. Different types of markets.
  - 3. Methods of marketing.

V. *Small fruits adapted to local conditions.*

- A. Varieties, with distinguishing characteristics of each.
- B. Adaptations.
- C. Fertilizers.
- D. Preparation of ground for planting.
- E. Planting and pruning.
- F. Care of growing plants.
- G. Insects and diseases and their control.
- H. Cultivation of fruits.
- I. Harvesting.
- K. Canning.
- L. Marketing.

VI. *Laboratory exercises, demonstrations and field trips.*

- A. Classification of fruits.
- B. Preparation of kerosene emulsion.
- C. Preparation of Bordeaux mixture.
- D. Propagation by budding.
- E. Tongue and root grafting.
- F. Preparation of waxed cloth or string; preparation of grafting wax.
- G. Pruning demonstration.
- H. Spraying demonstrations: comparison of types, nozzles, etc.
- I. Planting demonstrations.
- J. Picking demonstrations.
- K. Demonstration in packing.
- L. Study of diseases of stored fruits.
- M. Collection of insects and pests of fruits.
- N. Work and spray schedules for each fruit.
- O. Collection of specimens of all fruit diseases.
- P. Demonstration of treatment for borers.
- Q. Fruit thinning demonstration.
- R. Demonstrations of use and methods of storing and preserving different fruits.
- S. Grading and standardizing of fruit.
- T. Collection and storage of scion stock and roots for root grafting.
- U. Demonstration on identification of varieties.
- V. Demonstration on use of score cards for fruit exhibit.

VII. *Typical farm shop work correlating with a study of fruit production.*

- A. Bee hive.
- B. Fruit ladder.
- C. Trellis for grapes.
- D. Step ladders.

See Struck—Construction and Repair Work, for additional farm shop work.

VIII. *References*

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A UNIT IN FARM MECHANICS

I. *Farm Machinery and agriculture.*
  A. Introduction of farm machinery.
    1. Effect on agriculture.
    2. Effect on labor.
  B. Machines.
    1. Elements of machines.
    2. Essentials of a machine.
    3. Friction.
    4. Lubrication.
    5. Bearing.
    6. Wood vs. iron and steel.
  C. Tillage machines.
    1. Plows.
      a. Types.
      b. Construction and adjusting.
      c. Walking, sulky and gang.
    2. Harrows, pulverizers and rollers.
      a. Smoothing harrow.
      b. Spring-tooth harrow.
      c. Disk harrow.
      d. Cultipacker.
      e. Rollers (wood and iron)
    3. Cultivators.
      a. Riding and walking.
      b. Disk.
      c. Shovel.
      d. Single and double.
  D. Planting machines.
    1. Seeders.
      a. Hand.
      b. Wheelbarrow.
      c. Endgate.
    2. Grain drills.
      a. Disk.
      b. Shoe.
      c. Hoe.
    3. Corn planters.
      a. Shoe.
      b. Disk.
      c. Full—hill drop.
      d. Accumulative drop.
    4. Potato planter.
    5. Cabbage and tobacco planter.

E. Harvesting machines.

1. Grain binder.
    a. Operation.
    b. Tongue trucks.
2. Corn harvester.
    a. Upright.
    b. Horizontal.
3. Potato digger.
    a. Elevator.
    b. Horizontal.
4. Mowers.
    a. Types.
        1. Center draft.
        2. Side cut.
    b. Construction.
5. Hay rakes.
    a. Sulky.
    b. Side delivery.
6. Hay tedders.
    a. Construction.
    b. Operation.
7. Hay loaders.
    a. Fork.
    b. Endless apron.

F. Miscellaneous machines.

1. Hay forks and tracks.
    a. Single harpoon.
    b. Double harpoon.
    c. Derrick.
    d. Grapple.
2. Manure speaders.
    a. Return apron.
    b. Endless apron.
    c. Construction.
    d. Different drives.
3. Lime spreaders.
    a. Advantage of hand spreading.
    b. Expense.
4. Ensilage cutters.
    a. Types.
        (1) Radial knife.
        (2) Twisted knife.
        (3) Spiral knife.
    b. Elevator or blower.
    c. Self-feed.
    d. Mounted and unmounted.
5. Feed grinders and shellers.
    a. Advantage of feed-grinder on large farm.
    b. Size and capacity.
    c. Power mill.
    d. Power and hand shellers.

- G. Threshing machines.
  - 1. Types.
  - 2. Construction.
  - 3. Stacker attachment.
- H. Fanning mills and grain graders.
  - 1. Value.
  - 2. Operation and care.
- I. Spray machines.
  - 1. Hand sprayers.
  - 2. Barrel “
  - 3. Power “
- J. Care and repair of farm machinery.
  - 1. Housing.
  - 2. Painting.
  - 3. Winter repairing.

II. Gas or oil engines.

- A. The principle of the internal combustion engine.

- B. Stationary.
  - 1. One cylinder type.
    - a. Carburetion.
    - b. Ignition.
    - c. Lubrication.
      - (1) Bearings, etc.
      - (2) In high temperature.
    - d. Make and break and jump spark system.
    - e. Batteries, magnetos and dynamos.
    - f. Cooling system.

- C. Semi-portable.
  - 1. One cylinder.
  - 2. Multiple cylinder.
    - a. Carburetion.
    - b. Ignition.
    - c. Lubrication.
      - (1) Bearings, etc.
      - (2) In high temperature.
    - d. Make and break and jump spark system.
    - e. Batteries, magnetos and dynamos.
    - f. Cooling system.

- D. Portable.
  - 1. One cylinder.
  - 2. Two “
  - 3. Four “
    - a. Carburetion.
    - b. Ignition.
    - c. Lubrication.
      - 1. Bearings, etc.
      - 2. In high temperature.
    - d. Make and break and jump spark system.
    - e. Batteries, magnetos, dynamos.
    - f. Cooling system.

- E. Advantages and disadvantages.
- F. Automobiles.
- G. Trucks.
- H. Tractors.

III. Farm sanitation.

- A. Water systems.
  - 1. The pump.
    - a. Fundamentals.
    - b. Plungers.
    - c. Valves.
    - d. Stock.
    - e. Deep and shallow well.
  - 2. Hydraulic ram.
  - 3. Pneumatic system.
    - a. Gasoline.
    - b. Electric.
  - 4. Air power system.
  - 5. Tanks.
    - a. Concrete.
    - b. Wood.
    - c. Metal.
  - 6. Piping systems.
- B. Sewage disposal.
  - 1. Septic tanks.
    - a. Construction.
    - b. Purpose of tank.
    - c. Bacterial action.
  - 2. Cesspool.
    - a. Principle of disposal.
    - b. Construction.
- C. Lighting systems.
  - 1. Kerosene lamps.
  - 2. Gasoline lamps.
  - 3. Acetylene lamps.
    - a. Calcium carbide.
    - b. Production of acetylene gas.
    - c. Essentials of a good generator.
  - 4. Electric system.
    - a. Construction.
    - b. Core of storage batteries to prevent sulphation.
    - c. How to clean the brushes.
    - d. House wiring.
  - D. Heating systems.
  - 1. Stoves.
  - 2. Warm air furnace.
  - 3. Hot water system and radiators.
  - 4. Steam system and radiators.
  - 5. Ventilation.

IV. Miscellaneous mechanics.

- A. Pipe fitting.
- B. Soldering.
- C. Rope splicing and knots.

- D. Belt lacing.
- E. Pulley speeds and line shaft.
- F. Block and tackle.
- G. Harness repairing.

V. *Farm buildings.*

- A. Ventilation.
- B. Natural lighting.
    - 1. Value of plenty of light.
    - 2. Location and size of windows.
- C. Warmth.
- D. Dryness.
- E. Convenience.
- F. Construction.
- G. Concrete.
- H. Lightning rods.
- I. Fences.
- J. Creosote.
- K. Painting.

VI *Drainage.*

- A. Principles of farm drainage.
    - 1. Regulation of soil water.
    - 2. History of drainage.
    - 3. Kinds of soil.
    - 4. Lands requiring drainage.
    - 5. Open and under drains.
    - 6. Benefits of drainage.
- B. Laying out the drainage system.
    - 1. Direction, depth, length of drains.
    - 2. Systems of tile lines.
    - 3. Levels, grade.
    - 4. Guess system versus surveys.
    - 5. Survey and map of area to be drained.
- C. Choice of tile.
    - 1. Shape.
    - 2. Material.
        - a. Soft clay.
        - b. Hard clay.
        - c. Vitrified.
        - d. Concrete.
    - 3. Test for quality.
- D. Digging ditch and laying tiles.
    - 1. Hand digging.
    - 2. Ditching machines.
    - 3. Laying tile.
- E. Filling ditch.
    - 1. By hand.
    - 2. With plow.
    - 3. Drag.
    - 4. Road machine.

F. Protection of drain.
  1. From roots.
  2. Outlet protection.
  3. From entrance of silt and sand.

G. Open ditch.
  1. Construction.
  2. Disadvantages.
  3. Places where feasible.
  4. Use of dynamte.

H. Economics of tile drainage.
  1. Costs.
  2. Property increase, profits.

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A UNIT IN FARM MANAGEMENT AND FARM ACCOUNTS

I. General consideration of farm management.
  - A. Definition of farm management.
  - B. The object of farm management.
  - C. The scope of farm management.
  - D. Use of farm management in actual farming.
  - E. Object of studying farm management.
  - F. Terms used in farm management

II. Selecting farming as an occupation.
  - A. Stability of farming.
  - B. The relation of farming to the development of the country.
  - C. Personal elements for success

III. Selecting the farm business.
  - A. Locality limitations.
  - B. Capital limitations.
  - C. Personal inclination.
  - D. Diversified vs specialized farming.

IV. Selecting the farm.
  - A. When to rent.
  - B. Selecting the right land.
  - C. Factors to consider when selecting a farm.
    - 1. Personal.
    - 2. Earning capacity.
    - 3. Physical factors.
      - a. The shape of the farm.
      - b. Farm arrangement.
      - c. Topography.
      - d. Soil quality.
      - e. Physical properties.
      - f. Healthfulness.
      - g. Improvements.
      - h. Water supply for family and live stock.
      - i. Ease and cost of upkeep.
      - j. Markets.
      - k. Waste lands.
      - l. Woodlands.
    - 4. Labor social and financial factors.
      - a. Labor.
      - b. Neighbors.
      - c. Financial.
      - d. Financial test for proposed farm proposition.
    - 5. Size of farm.
    - 6. Actual examinations of the farm.
    - 7. Value in farm lands.
    - 8. Buying and selling farm lands.

V. *Organizing the farm business.*

- A. Size of business.
  - 1. Size of farm vs size of farm business.
  - 2. Ways of measuring size.
  - 3. Relation of size of business to labor income.
  - 4. Reasons why large size business pays best.
  - 5. Ways of enlarging business.
  - 6. Optimum size of business.
  - 7. Limits to size.
  - 8. Sons staying at home.
  - 9. Public welfare.
- B. Balance of business.
  - 1. Use of pasture.
  - 2. Use of wastes and unmarketable feed stuffs.
  - 3. Labor distribution.
  - 4. Use of equipment—man, horse, machinery.
  - 5. Use of buildings.
  - 6. Use of manure.
  - 7. Risk of business.
  - 8. Distribution of income.
  - 9. Sources of income.
- C. Production.
  - 1. Average yields of crops—home, farm, township, county, state. United States.
  - 2. Relation of crop index to labor income.
  - 3. Average rates of production for stock. (pigs per sow, eggs per hen, colts per mare, etc.)
  - 4. Relation of varying production to labor income. (pounds milk per cow, yields per acre.)
  - 5. Yield and rates on successful farms.
  - 6. Diminishing returns and agricultural production.
  - 7. Ways of increasing production.
- D. Efficiency.
  - 1. Acres of crops per man.
  - 2. Acres of crops per horse.
  - 3. Acres of crops per $100 worth of machinery.
  - 4. Work units per man.
  - 5. Work units per horse.
  - 6. Work units per $100 worth of machinery.

VI. *The soil factor.*

- A. Rotation of crops and cropping systems.
- B. Green manuring.
- C. Commercial fertilizers.
- D. Stable manures.

VII. *The calendar of operations.*

- A. Value of a calendar of operations.
- B. Graphic presentations of calendar of operations.

VIII. *Choice of farm equipment.*

- A. Factors governing selection.
- B. Justifying equipment.

IX. *Building equipment.*
   A. Good and bad farm buildings.
   B. Studying proposed buildings.

X. *Fencing, work stock, implements and machinery.*
   A. Kinds of fencing.
   B. Gates.
   C. Work stock.
   D. Implements and machinery.
   E. Minor equipment.
   F. Cost of equipment.

XI. *The capital requirements of farming.*
   A. Factors determining the amounts needed.
   B. Methods of obtaining.
   C. Capital requirements of tenant farming.
   D. Sources of capital.

XII. *Farm profits.*

   A. What the business should pay.
   B. Labor income as a measure of profits.
   C. Income as tenant or owner.

XIII. *Farm bookkeeping.*

   A. Necessity for.
   B. Methods of keeping.
   C. Scope of complete farm accounts.
   D. Simple accounts.
   E. Value of cost records.
   F. What records to keep.
   G. Interpretation and use of results.
   H. Inventory—How to take.
   I. Single enterprise accounts.
   J. Complete set stock and crop accounts.
   K. Income tax returns.
   L. Costs of producing live stock, crops and stock products.

XIV. *Farm accounts project.*

The farm accounts project should be required of all pupils taking Farm Management. In order that the project may be completed before the close of the school year it is suggested that pupils who contemplate taking Farm Management be required to begin the farm accounts project the preceding year, by at least making a brief study of the principles of farm accounts and taking an inventory of a farm either of the home farm or a farm located in the neighborhood. The farm accounts project should be carried on according to the principles of farm accounts set forth in any of the standard textbooks.

XV. *Marketing.*

   A. How farm products are marketed.
   B. Marketing agencies.
   C. Market quotations.
   D. When to market.
   E. What to market.
   F. How to market.

XVI. Farm labor.

- A. Classes of farm labor.
- B. Kind of help needed by farmers.
- C. The workers viewpoint.
- D. Handling labor.
- E. What constitutes a day's work.
- F. Man.
  - 1. Factors affecting in Pennsylvania.
  - 2. Problems of local community.
- G. Horse.
  - 1. Adaptability to local conditions.
  - 2. Cost.
- H. Substitutes.
  - 1. Cost.
  - 2. Adaptability to local conditions.

XVII. Farm tenancy.

- A. The principal kinds of tenure.
  - 1. Share tenancy.
  - 2. Cash tenancy.
  - 3. Combination of share and cash.
- B. Farm leasing forms.

XVIII. Farm Law.

- A. What law is.
- B. Written law.
- C. Unwritten law.
- D. Conceptions of the law.
- E. What farmers should be familiar with.

XIX. Laboratory exercises and field trips.

- A. Planning a crop rotation.
- B. Making a farm inventory.
- C. Making a survey of the community.
- D. Keeping accounts on home farm.
- E. Planning a farm layout.
- F. Planning the farm buildings and their location.
- G. Determining the amount of tenancy in the community with tendencies and causes.
- H. Planning for the rejuvenation of a run-down farm.
- I. Calendar of farm operations.

XX. References.

A. Books

Adams—Farm Management—McGraw-Hill Book Co.

Boss—Farm Management—Lyons and Carnahan. Chicago.

Penn State Farmer's Account Book—State College, Pa.

Warren—Farm Management—MacMillan Co., N. Y.

Bulletins

Federal Bureau of Farm Management, U. S. Department of Agriculture, Washington, D. C.

Pennsylvania State College, State College, Pa.

A UNIT IN RURAL LAW

I. *Law and litigation...*
  - A. Kinds of law.
    - 1. Derivation.

II. *Farmers before the law.*
  - A. Bankrupt law.
  - B. Exempting property from levy and sale.
  - C. Farmer within tax and license laws.
  - D. Element of banking.
    - 1. Loaning money.
    - 2. Securing credit.
    - 3. Federal Farm Loan Act.

III. *Modes of acquiring land.*
  - A. How title to land is acquired.
    - 1. By grant or deed.
    - 2. By devise or will.
    - 3. By descent.
    - 4. By prescription.
    - 5. By accession.

IV. *Title to the land by deed.*
  - A. Effect of a deed.
  - B. Contents of deed.
  - C. Covenant against encumbrance, etc.

V. *The farmer in possesion of the farm.*
  - A. Actual and constructive possession.
    - 1. Adverse possession.
    - 2. Color of title.
    - 3. Adverse possession by squatter.

VI. *The farm, its entent. area, and components.*
  - A. Area of farm.
  - B. Of what farm is composed.
  - C. Extension of farm.
  - D. Pennsylvania Fence Laws.

VII. *The boundaries of the farm.*
  - A. Existence and recognition of boundary.
  - B. Running lines.
  - C. Division fences.
  - D. Settling disputed division lines.
  - E. Trees on or near division lines.
  - F. Highways on boundaries.
  - G. Water lines.

VIII. *Appurtenances and easements.*
  - A. Appurtenances easements, fixtures.
    Trade fixtures. Rights of way, ways of necessity.
    Water service, licenses.

IX. *Farm workers and laborers.*
  - A. Relation of farmer and his workers.
  - B. Right to discharge.
  - C. Right to quit.

- D. Servant's right to wages.
- E. Compensation Law—Workmen's Insurance.
- F. Croppers.
- G. Tenants.

X. *Waters of the farm.*
- A. What the waters comprise.
- B. Bodies of water.
- C. Water courses.
- D. Navigable streams.
- E. Floatable streams.
- F. Surface water.
  - 1. Disposal of.
- G. Underground and percolating waters.
- H. Ice.

XI. *Police power of the State.*
- A. Limits of power.
- B. Quarantine and inspection laws.
- C. Abatement of nuisances.
- D. Power to destroy private property.
- E. Trespass Law of 1901.

XII. *Police power in municipalities.*
- A. Relations of the farmer with neighboring towns.
- B. Nuisances.
- C. Animals in the public streets.
- D. Regulation and collection of garbage.
- E. Huckstering.
- F. Regulation of traffic laws and rules.

XIII. *Laws to secure pure milk.*
- A. General regulation of milk production and sale.
- B. License laws.
- C. Right to seize milk without payment.
- D. Standards of richness.
- E. Laws against adulteration.
- F. Measures and quantity.

XIV. *Pure Food Laws.*
- A. Power of the legislature.
- B. Congressional legislation.
- C. Milk Plant Inspection—Act May 23, 1919, P. L. p. 275.
- D. Meat Hygiene Law—Act of May 28, 1915—Act of July 5, 1917.
- E. Milk Hygiene Law.
- F. General Pure Food Law—Act of May 13, 1909, P. L. p. 520.
- G. Cold Storage Law—Act of June 26, 1919, P. L. p. 670.
- H. Fresh Meat, Poultry, Game and Fish Law—Act of March 28, 1905. P. L. p. 64.
- I. Sausage Law—Act of April 6, 1911, P. L. p. 51.
- J. Lard Law—Act of March 11, 1909, P. L. p. 17.
- K. Egg Laws—Eggs Unfit for Food—Act of May 23, 1919. P. L. p. 267—Act of March 11, 1909, P. L. p. 13.
- L. Fresh Eggs—Act of June 10, 1919, P. L. p. 900.
- M. Oleomargarine Law—Act of May 29, 1901, P. L. p. 327.
  Act of May 10, 1921, P. L. p. 467.

- N. Cheese Law—Act of June 23, 1897, P. L. p. 202.
- O. Imitation Dairy Products in Penal and Charitable Institutions—Act of May 23, 1893. P. L. p. 112.
- P. Fruit Syrup Law—Act of April 26, 1905, P. L. p. 311.
- Q. Vinegar Law—Act of June 18, 1897, P. L. p. 168.
- R. Coffee and Chicory Law—Act of May 5, 1915, P. L. p. 247.
- S. Non-Alcholic Drinks Laws—Adulteration and Misbranding—Act of March 11, 1909, P. L. p. 15, Act of May 25, 1921, P. L. p. 1116.
- T. Sanitary Production—Act of May 10. 1921, P. L. p. 468.
- U. Milk and Cream Law—Act of June 8, 1911, P. L. p. 712.
- V. Adulteration or Coloring of Milk and Cream Law—Act of June 10, 1897, P. L. p. 142.
- W. Ice Cream Law—Act of March 24, 1909, P. L. p. 63.
- X. Renovated or Process Butter Law—Act of July 10, 1901, P. L. p. 643.
- Y. Butter Law—Act of April 13, 1921, P. L. p. 129.

XV. *Crops and other farm produce.*

- A. Legal status of growing crops.
- B. Emblements.
- C. Effect of severing crops from the soil.
- D. Damages for loss or destruction of crops.
- E. Rights of the landlord and tenant.
- F. Crops grown on shares.
- G. Marketing laws.
- H. Manure.

XVI. *Livestock.*

- A. Registration of animals.
- B. Cruelty to animals.
- C. Estrays.
- D. Animals running at large.
- E. Liability of owner for acts of domestic animals.
- F. Runaway horses.
- G. Fright in horses.
- H. Trespasses of animals.
- I. Progeny of domestic animals.
- J. Penna. Livestock Law—Act of July 22, 1913.
  - 1. Authority of agent of Bureau of Animal Industry.
  - 2. Transmissible disease.
  - 3. Transportation of animals into Penna.
  - 4. Immediate slaughter—Federal regulation No. 7.
  - 5. Quarantine.
  - 6. Animals dying of disease.
  - 7. Tuberculin infected.
- K. Stallion License Law—Act of April 21, 1921.
- L. Swine Regulation No. 503.
- M. Sheep and Goats. Regulation No. 507.
- N. Disinfection Cars and Vehicles.
- O. Tuberculin testing.

XVII. *Dogs.*

- A. Dogs as property.
- B. Liability for injuries done by dogs.
- C. Lawful killing of dogs.

- D. Sheep killing dogs.
  - 1. Penna. Law—Act of May 11, 1921.
- E. Dogs in the statutes.

XVIII. Contracts.
- A. Nature of a contract.
- B. Classification of contracts.
- C. Construction and interpretation of contracts.

XIX. Oral and written contracts.
- A. Nullity of oral contracts.
- B. Contracts concerning real property.
- C. Oral abrogation or alteration of written contracts.

XX. The enforcement of contracts.
- A. Compelling specific performance.
- B. Avoiding performance.
- C. Excuses for non-performance.
- D. Illegal contracts.
- E. Wagering or gambling contracts.
- F. Contracts obtained by fraud.
- G. Contracts made under mistake.

XXI. Sales.
- A. The State of the law of sales.
- B. Essentials of a sale.
- C. Executory contracts of a sale.
- D. The intention of the parties.
- E. Offers and acceptances.
- F. Sales of indefinite quantities.

XXII. Completing sales.
- A. Delivery.
- B. Requisites of a delivery.
- C. Delivery to common carriers.
- D. Effect of a buyer's accepting the property.

XXIII. Warranty.
- A. Express and implied warranties in sales.
- B. Seed and nursery stock.
- C. Grain fruit and vegetables.
- D. Food for men and animals.
- E. Farm implements and machinery.
- F. Buyer's rights and remedies.

XXIV. Factors or commission merchants.
- A. Commission merchant as the law knows him.
- B. Limitations of factor's authority.
- C. Duty of factors.
- D. Factors right to reimbursement for advances.

XXV. Common carriers.
- A. Public obligations of carriers.
- B. Legal meaning of the term "Act of God".
- C. Examples.
- D. The public enemy.

XXVI. Duties of common carriers.

- A. Duty to receive freight.
- B. Duty to furnish cars.
  - 1. Suitable cars.
- C. Duty to deliver to consignee.
- D. Duty to care for livestock in transit
- E. Duty respecting perishable property.

XXVII. Rights of common carriers.

- A. To make rules and regulations.
- B. Bill of lading as a contract for carriage.
- C. Concerning perishable property.

XXVIII. Insurance of property against fire and other losses.

- A. Nature of insurance.
- B. Insurance contract.
  - 1. Its elements.
- C. Completing contract.
- D. Policy.
- E. Renewal of fire insurance.
- F. Cancelling the policy.
- G. Risks.
- H. Location of insured property.
- I. Notice and proof of loss.
- J. Time limitations on the bringing of suit.

XXIX. Cooperative fire insurance.

- A. Distinction between cooperative and other companies.
- B. Rights and remedies of policy holders.

XXX. Live stock insurance.

XXXI. Miscellaneous agricultural laws.

- A. County fair associations—Act May 27, 1921, 422, as P. L. p. 279—Act July 25, 1917, P. L. p. 1195.
- B. Crop pest control—Act No. 236, approved June 29, 1917, and as amended by Act No. 142, approved April 26, 1921.
- C. Seed law—Act No. 159. approved April 26, 1921.
- D. Insecticides and fungicide law—Act No. 124, approved May 17, 1917.
- E. Inspection of bees and apiaries—Act No. 58, approved April 6, 1921.
- F. Potato wart control—Act No. 55, approved April 18, 1919, and as amended April 6, 1921.
- G. Linseed oil law—Act of April 29, 1913. No. 82, P. L. p. 123.
- H. Paint, putty, and turpentine law—Act of June 1, 1915, No. 297, P. L. p. 665.
- I. Assessors Law—Act of April 14, 1897, P. L. p. 22—Act of April 26. 1921, P. L. p. 305.
- J. Commodity Act—Act 445, 1913. P. L. p. 965.
Act 128. 1921. P. L. p. 253.
- K. Vandal Act—Act No. 235.

XXXII. Market laws of Pennsylvania.

- A. Standard Container Law—Act 337, 1919, P. L. p. 809.
- B. Standard Grade Law—Act. 337, 1919, P. L. p. 809.
Act 288, 1921, P. L. p. 829.

C. Apple Packing Law—Act 144, 1917, P. L. p. 206.
D. Cooperative Stock Company Act—Act 252, 1887 P. L. p. 365.
E. Cooperative Non-Stock Association Law—Act 238, 1919. P. L. p. 446.

XXXIII. Feeding stuffs law.
A. Feeding stuffs law—Act of May 3, 1909, No. 224, P. L. p. 395, as amended May 11, 1921, No. 229, P. L. p. 490.

XXXVI. Fertilizer law.
A. Fertilizer Law—Act of May 1, 1909, No. 205, P. L. p. 344, as amended May 29, 1917, No. 184, P. L. p. 329.
B. Lime Law—Act of June 1, 1915, No. 306, P. L. p. 678.

XXXV. Game, fish and forest laws.
A. Game commission.
B. Care of game and wild birds.
C. Protection of game, song and insectivorous birds.
D. Laws relative to fish, protection, etc.
E. Department of Forestry.
F. Forest land owned and reforested by State.
G. Forest fires.

XXXVI. School law.
A. Vocational agricultural schools.
  1. Smith-Hughes law.
B. Consolidation.
C. Attendance.
D. Vaccination.
E. Cigarette law.
F. Flag.
G. Medical inspection.
H. School indebtedness and bonds.
I. Taxation for school purposes.

XXXVII. Motor vehicle laws.
A. Act against theft of motor vehicles.
B. Act against burning of motor vehicles.
C. Act dedicating motor fees to State Highway Department.
D. Act requiring drivers license.
E. Act relative to used or second hand motor vehicle.
F. Act relative to speed and weight.
G. Act relative to vehicles other than motor vehicles.
H. General motor vehicle law.

XXXVIII. Cooperative associations.
A. Organization.
B. Management.
C. Profit—dividends.

XXXIX. Income tax.
A. Calculation.
B. Exemptions.

XL. Bibliography for rural law.
A. Books.
Blackstone.
Bouviers Law Dictionary—Published by The Vernon Law Book Co., Kansas City, Mo.

Green—Law for the American Farmer—Macmillan Co., New York.
Kents' Commentaries.

B. Bulletins.
    Motor Vehicle Laws—Bulletin No. 20—State Highway Department, Harrisburg, Pa.
    Rural Law Extension Bulletin, Penna. State College, State College, Pa.
    School Code—Department of Public Instruction, Harrisburg, Pa.
    Game, Fish and Forest Laws—Department of Forestry, Harrisburg, Pa.
    Miscellaneous State laws, affecting agriculture, State Department of Agriculture, Harrisburg, Pa.

A UNIT IN RURAL SOCIOLOGY

I. *General problems.*

- A. The rural problem.
    - 1. The importance of agriculture to the nation.
- B. Physical background.
    - 1. Influence of environment.
- C. Population (rural)
    - 1. Changes in size, character, and location.
    - 2. Depopulation—Causes and effects.
- D. Tenancy.
    - 1. Causes of increase.
    - 2. Social effects.
    - 3. Proposed remedies.
- E. Means of communication.
    - 1. Roads, telephones, wireless phone. significance of each in country.

II. *Rural Health and sanitation.*

- A. Wells.
    - 1. Location.
    - 2. Contamination of, testing, etc.
- B. Outdoor toilets.
    - 1. Defects.
    - 2. Type needed.
- C. Sewage disposal, with running water equipment.
    - 1. Septic tank.
    - 2. Cesspools.
- D. Household sanitation.
    - 1. Ventilation.
    - 2. Food, character and preparation.

III. *Feeblemindedness.*

- A. Extent in rural districts.
- B. Causes.
- C. Significance to all society.
- D. How to deal with it.

IV. *Rural institutions.*

- A. The home.
    - 1. Its place and value in American Democracy.
        - a. Specific training afforded children.

- 2. Deficiencies and how to remedy them.
    - a. Equipment.
    - b. Social functioning.
- 3. Relief for farm wife and mother.
- 4. Beautification of house and grounds.

B. The school.

- 1. The one-room school as shown by a survey.
    - a. Its inadequacy.
    - b. Failure to meet present day needs.
    - c. Administration.
        - (1) Weakness.
        - (2) Reform.
- 2. The one-teacher school of the future.
- 3. The consolidated school.
- 4. The rural community vocational school as a social force.
- 5. The rural school program of Pennsylvania.

C. The church.

- 1. The decline of the rural church.
    - a. Causes.
    - b. Effects.
- 2. Improvement of present conditions.
    - a. Elimination and federation.
    - b. Training and remuneration of ministers.
- 3. The Sunday School as a vitalizing factor.
- 4. Relation of church to the community recreation program.

D. The grange.

- 1. History of development, purpose, etc.
- 2. Present status and functions.
- 3. Value in rural social life.

E. Economic and fraternal organizations.

- 1. Fraternal organizations and clubs.
    - a. Purposes and social value.
    - b. Extension of club movement for specific ends.
- 2. Economic organizations.
    - a. Influential organizations in the United States.
        - (1) Present day movements.
        - (2) Co-operative associations.
        - (3) Co-operative banks.
        - (4) Farm Bureau Federation.

F. Other organizations of social and economic value.

- 1. Agricultural colleges and experiment stations.
    - a. Use of bulletins.
    - b. Value of specialists.
- 2. United States Department of Agriculture.
    - a. Extensive and free publications.
    - b. Value of research.
- 3. The Federal Bureau of Farm Management.
- 4. The local county farm bureau.

V. *The village and the town in relation to country life.*

A. Relation to open country.

- 1. Exploitation in the past.
- 2. Co-operation of the future.
- 3. Banks, stores, etc. as community service stations.

- B. Internal problems.
    - 1. Development of civic interest.
    - 2. Water supply.
    - 3. Sewage and garbage disposal.
    - 4. Streets, paving and lighting.
    - 5. Beautification—parks, etc.
- C. As community centers.
- D. Social activities.
    - 1. Playground.
    - 2. Recreation hall.

VI. *The community idea.*

- A. Definition.
- B. How to determine the community limits.
- C. Community needs..
- D. Community action, and how to secure it.
- E. The community center.
    - 1. In the schoolhouse.
    - 2. In the church.
    - 3. In a separate community house.

VII. *The community survey.*

- A. Purposes of.
- B. Types.
- C. Methods of conducting survey by school.
- D. Analysis and tabulation of surveys.

Note: The double period allowed for laboratory in Rural Sociology, in the suggested schedule of classes, may be used to advantage in making community surveys.

VIII. *Rural recreation.*

- A. Needs arising from changed rural conditions.
- B. Types of games, etc.
- C. The organization of a community recreation program.

IX. *Rural leadership.*

- A. Scarcity of trained leaders.
    - 1. Causes.
    - 2. Effects.
- B. Training an effective local leadership.

X. *References.*

- A. Books.
    - *Boyle*—"Agricultural Economics"—Lippincott Co., Philadelphia, Pa.
    - *Galpin*—"Rural Life"—The Century Co., N. Y.
    - *Gillett*—"Construction Rural Sociology"—Sturgis and Walton Co., New York City.
    - *Wilson*—"Evolution of the Country Community"—Pilgrim Press, New York.
    - *Vogt*—"Introduction to Rural Sociology"—S. Appleton & Co., New York City.
    - *Carver*—"Principles of Rural Economics"—Ginn & Co., N. Y.

FARM SHOP WORK CORRELATING WITH UNIT COURSES

I. *Tools.*
  - A. Nomenclature.
  - B. Selection.
    - 1. Kinds.
    - 2. Quality.
    - 3. Number.
  - C. Care.
    - 1. Sharpening.
    - 2. Storing.

II. *Materials and supplies.*
  - A. Lumber.
    - 1. Grading.
    - 2. Curing.
    - 3. Availability.
    - 4. Adaptability.
  - B. Hardware.
    - 1. Adaptability.
  - C. Estimating.

III. *Farm shop problems.*
  - A. Related to enterprise being studied.
  - B. Working drawings.
  - C. Construction—The pupil learns the tool processes as the actual construction progresses. Tool processes should not be taught as preliminary problems.

IV. *Suggested farm shop problems in wood in correlation with the unit courses in vocational agriculture.*
  - A. Poultry husbandry.
    - 1. Brooder.
    - 2. Chicken coop.
    - 3. Colony house.
    - 4. Crate.
    - 5. Egg tester.
    - 6. Feed bin.
    - 7. Feed troughs for chicks.
    - 8. Hooper for grit and shell.
    - 9. Mash-hoppers for chicks and poultry.
    - 10. Nests.
    - 11. Oats sprouter.
    - 12. Portable run-ways.
    - 13. Poultry house.
    - 14. Self feeder.
    - 15. Soiling crops rack.
    - 16. Trap nest.
    - 17. Water stand for poultry.
  - B. Vegetable gardening.
    - 1. Compost screen.
    - 2. Cold frame.
    - 3. Dibber.
    - 4. Field berry carrier.

5. Garden marker.
6. Flats.
7. Germination box.
8. Hot bed.
9. Plant trellises.
10. Seed cabinet.
11. Tool house.

C. Farm crops.

1. Bag holder.
2. Corn crib.
3. Corn and potato crates.
4. Grain bin.
5. Planting stick.
6. Potato grader.
7. Seed corn storage devices.
8. Seed corn curing rack.
9. Seed potato cutting rack.
10. Seed potato tray.

D. Animal husbandry.

1. Breeding crates.
2. Feeding troughs.
3. Creeps for lambs and pigs.
4. Curry comb cabinet.
5. Feeding racks.
6. Harness hook.
7. Hog cots.
8. Hog house.
9. Hog hurdles.
10. Mangers.
11. Self feeders.
12. Shipping crates.
13. Smoke house.
14. Stalls for horse stable.
15. Unloading chutes.
16. Wool tying box.

E. Dairy husbandry.—In addition to many of the preceding animal husbandry problems the following may be given.

1. Butter paddle.
2. Calf weaner.
3. Lever butter worker.
4. Milk cooling trough.
5. Milk cooling vat.
6. Milk record case.
7. Milking stool.
8. Silage on feed chart.
9. Stanchions.

F. Fruit production.

1. Apple packer.
2. Fruit ladder.

3. Sorting tables.
4. Step ladder.

G. Miscellaneous—Miscellaneous farm shop problems may be done in connection with any one of the unit courses.

1. Bench hock.
2. Bench stop.
3. Bread board.
4. Double trees.
5. Drawing board support.
6. Evener.
7. Farm gates.
8. Fences.
9. File handles.
10. File rack.
11. Fireless cooker.
12. Flight of steps.
13. Flower box.
14. Fly trap.
15. Harness horse.
16. Implement shed.
17. Ironing board.
18. Kitchen stool.
19. Kitchen bin.
20. Mallet.
21. Neck yoke.
22. Lumber rack.
23. Miter box.
24. Medicine cabinet.
25. Plant stand.
26. Saw buck.
27. Saw horse.
28. Saw jointers.
29. Scoop board.
30. Single tree.
31. Snow plow.
32. Tool box.
33. Tool carrier.
34. Tool chest.
35. Tocl rack.
36. Utility box.
37. Vise handle.
38. Wagon box.
39. Wagon seat.
40. Wagon jack.
41. Wagon tongue.
42. Wagon top.
43. Wash bench.
44. Windlass.
45. Wood box.
46. Wood shed.
47. Work bench.
48. Window screen.
49. Miscellaneous repair werk.

V. *Bibliography.*

A. Books.

Blackburn—Farm woodworking—Manual Arts Press. Peoria. Ill.
Brace and Mayne—Farm Shop Work—American Book Co.. N. Y.
Burton—Shop Projects Based on Community Problems—Vocational Supply Company. Muncil. Ind.
Evans—Hogology—Doty Publishing Company.
Ekblaw—Farm Structures—Macmillan Company. N. Y.
Foster and Carter—Farm Structures—John Wiley & Sons. N. Y.
French and Ives—Agricultural Drawing—McGraw-Hill Book Company. N. Y.
French and Sevenson—Mechanical Drawing for High Schools—McGraw Hill Book Company. N. Y.
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Griffith—Teaching Manual and Industrial Arts—Manual Arts Press. Peoria. Ill.
Kellogg—Lumber and Its Uses—Manual Arts Press.
Laughlin—Tool Processes in Woodworking—Manual Arts Press.
Roehl—Agricultural Woodworking—Bruce Publishing Co.. Milwaukee. Wis.
Roehl—Farm Woodwork. Bruce Publishing Company. Milwaukee. Wis.
Rolfe-Colleigh—Handy Farm Devices and How to Make them—*Orange*-Judd Company. N. Y.
Struck—Repair and Construction Work for the Farm—Houghton-Mifflin Company. Boston. Mass.
Wyatt—Blue Print Reading—Bruce Publishing Co., Milwaukee. Wis.

B. Bulletins.

Published by the Education Division of such companies as
Disston and Son. Philadelphia, Pa.
Carborundum Company, Niagara Falls.

NOTE:—See Farm Shop Work Bulletin pp. 75-79 State College. for list of equipment.

VI. *Wood finishing.*

A. Paint.
  1. Definitions.
  2. Reasons for painting.
    a. Protection.
    b. Decoration.
    c. Sanitation.
  3. Brushes and other paraphernalia.
    a. Kinds and adaptations.
    b. Care of brushes.
  4. Composition of paints.
    a. White.
    b. Dark.
  c. Tinted.
    d. Whitewash.
  5. Mixing paints.
    a. Ready mixed.
    b. Powder pigment.
    c. Paste pigment.
    d. How to mix.

6. Preparation of surfaces for painting.
    a. Drying.
    b. Cleaning.
7. Exterior painting.
    a. Number of coats.
    b. Composition of paint.
8. Interior painting.
    a. Colors, and factors affecting same.
    b. Amount of drier.
9. Painting metal.
    a. Cleaning.
    b. Number of coats.
    c. Content of paints.
10. Drying.
    a. Water paints and calcimine.
    b. Oil paints.
    c. Factors affecting drying.

B. Shellac and varnishes.

1. General information.
    a. Care.
    b. Thinning.
    c. Relation to stains and other varnishes.
    d. Drying.
    e. Bleaching.
2. Advantages.
    a. Dries rapidly.
    b. Transparent.
    c. Cheap.
    d. May obtain variety of finishes.
3. Disadvantages.
    a. Raises grain of wood.
    b. Water will spot it.
    c. Cypress may make it cloudy.

C. Fillers and filling.

1. General information.
    a. Purpose of fillers.
    b. Kinds of woods to fill.
    c. Kinds of fillers.
        (1) Liquid.
        (2) Paste.
    d. Preparation of wood.
2. Requisites of a good filler.
3. Method of applying.
4. Cautions.

D. Stains and staining.

1. Object of staining.
    a. To emphasize grain of wood.
    b. To imitate other wood.
    c. To apply color or design.
    d. To give appearance of age.

- 2. Classes of stains with characteristics.
  - a. Oil.
  - b. Water.
  - c. Spirit.
- 3. Stains in general.
  - a. Number of coats.
  - b. Method of applying.
  - c. End and surface grain.
- 4. Special stains.
- 5. Permanency of stains.
  - a. Aniline.
  - b. Mineral.

E. Fuming.
- 1. Method.
- 2. Kinds of wood that may be fumed.
- 3. Cautions.

F. Varnishes.
- 1. Relation to shellac.
- 2. Gums used in varnishes..
- 3. Testing varnish.
  - a. For elasticity.
  - b. Rapidity of drying.
  - c. "Sandy" varnishes.
- 4. Method of applying.

VII. Iron work.

A. Tools and equipment.
- 1. Kinds.
- 2. Care.

B. Materials.
- 1. Iron.
- 2. Coal.
- 3. Flux.

C. Fire.
- 1. Building.
- 2. Making coke.
- 3. Clinker.
- 4. Banking.
- 5. Cleaning.
- 6. Oxidizing.

D. Forge processes.
- 1. Drawing out.
- 2. Bending.
- 3. Twisting.
- 4. Welds.
  - a. Common.
  - b. Special.
- 5. Hardening and tempering steel.
- 6. Tool forging.

E. Cold iron operations.

F. Problems.—Any problem in wood, requiring iron fittings, should be completed by the boys. Additional problems adapted to the needs of the local community should be completed.

G. Bibliography for iron work.

Bacon—Forge Practice—John Wiley & Sons, N. Y.
Brace and Mayne—Farm Shop Work—American Book Company, N. Y.
Drew—Farm Blacksmithing—Webb Publishing Co., St. Paul, Minn.
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Harcourt—Elementary Forge Practice—Manual Arts Press, Peoria, Ill.
Struck—Repair and Construction Work for the Farm—Houghton-Mifflin. Co., Boston, Mass.

VIII. *Concrete.*

A. Definition.

B. Tools and quipment.

1. Kinds.
2. Care.

C. Materials.

1. Cement.
   - a. Definition.
   - b. History.
   - c. Manufacture.
   - d. Storage.
2. Aggregates.
   - a. Sand.
   - b. Gravel.
   - c. Grading.
3. Water.

D. Proportioning and mixing concrete.

1. Principles.
   - a. Strength.
   - b. Density.
2. Recommended mixtures.
3. Hand mixing.
   - a. Successive steps.
   - b. Amount of water.
   - c. Cautions.

E. Placing concrete.

1. Methods of transporting.
2. Methods of compacting.
3. Cautions.

F. Protections during hardening period.

1. Nature of hardening action.
2. Methods of protection.
3. Protection during cold weather.

G. Reinforcing.
  1. Definition.
  2. Principle.
  3. Amount of steel used.

H. Making water-tight.
  1. Ideal proportioning.
  2. Special surface treatment.
  3. Water-repellant mixtures.
  4. Water-proofing materials.

I. Common errors in concrete work.

J. Suggestive list of problems.

  1. Equipment made by pupils.
    a. Forms.
    b. Measuring box.
    c. Mixing box.
    d. Mixing platform.
    e. Screen for sand and gravel.
    f. Tamper.
    g. Wood float.
  2. Problems in concreting.
    a. Chimney cap.
    b. Fence posts.
    c. Manure pits.
    d. Feeding floors.
    e. Flower box.
    f. Feeding trough.
    g. Foot scraper.
    h. Garden bench.
    i. Hot beds and cold frames.
    . Hog wallow.
    k. Watering troughs.
    l. Well top.

K. Bibliography.

  1. Books.

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Crane—Cement and Its Use on the Farm—University of Minnesota.
Ekblaw—Farm Concrete—Macmillan Company, New York.
Lewis and Chandler—Popular Handbook for Cement and Concrete Users—Henley Publishing Company, New York.
Seaton—Concrete Construction for Rural Communities—McGraw-Hill Book Co., New York.
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Wood and Smith—Prevocational and Industrial Arts—Atkinson, Mentzer and Co., Chicago.

  2. Bulletins.

Bulletins of the Portland Cement Associations, Chicago, Ill.
Farmers Bulletins No. 461—The Use of Concrete on the Farm"—U. S. Department of Agriculture, Washington, D. C.

IX. *Leather.*

- A. Tools and equipment.
- B. Problem suggested.
  - 1. Making waxed thread.
  - 2. Threading needles.
  - 3. Splicing.
  - 4. Making holes thru leather.
  - 5. Repairing a trace.
  - 6. Attaching a snap or buckle to a strap.
  - 7. Homemade buckle shield.
  - 8. Hame repairs.
  - 9. Making hame strap.
  - 10. Stitching a loop.
- C. Bibliography for leather.

  Roehl—Harness Repairing—Bruce Publishing Company., Milwaukee, Wis.

  Struck—Repair and Construction Work for the Farm—Houghton-Mifflin Co., Boston, Mass.

X. *Pipe fitting and soldering.*

- A. Tools and equipment.
- B. Materials and supplies.
  - 1. Pipe compounds.
  - 2. Cementing compounds.
  - 3. Soldering compounds.
- C. Processes.
  - 1. Cutting.
  - 2. Threading.
  - 3. Reducing.
  - 4. Suspending.
  - 5. Joining.

  The school plant will, from time to time, offer problems in repair work. Farm homes will offer an additional field.
- D. Biblography—

  Struck—Repair and Construction Work for the Farm—Houghton-Mifflin Co., Boston, Mass.

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